THOMAS A. RUBIN, CPA, CMA, CMC, CIA, CGFM, CFM
2007 Bywood Drive
Oakland, California 94602-1937
Home Office Telephone/FAX: (510) 531-0624
LAUSD: (213) 241-5182 Mobile: (213) 447-6601
e-mail: tarubin@earthlink.net

Metropolitan Transportation Commission May 16, 2013
Public Information Office
101 Eighth St.
Oakland, California 94607

Re: Comments on ABAG's and MTC's *Draft Plan Bay Area* and *Environmental Impact Report Plan Bay Area Draft*

Dear Sirs:

This letter shall serve as my comments on the Association of Bay Area Governments' (ABAG) and Metropolitan Transportation Commission's (MTC) *Draft Plan Bay Area* (*Plan*), March 2013, and *Environmental Impact Report Plan Bay Area Draft* (DEIR), April 2013, State Clearinghouse No. 2012062029.

I submit these comments on behalf of myself and Bay Area Citizens.

I have lived in Oakland for the past seventeen years and have previously lived in five other locations in Alameda and Marin Counties and the City and County of San Francisco, with total Bay Area residency of over thirty years, beginning in 1970.

I submit these comments both as a concerned citizen, local resident, taxpayer, and user of the Bay Area transportation system, and as an expert with over forty years of experience in local government, with specialties in governmental surface transportation, transportation finance, long-term planning, transportation performance measurement and reporting, and program/project management, among other relevant fields. I have served almost every major Bay Area transit operator and many of the smaller ones, as well as MTC itself, with a variety of projects and/or as an auditor, as well as well over 100 other transit agencies, local planning agencies, state departments of transportation, Federal transportation agencies, not-for-profits, and transportation suppliers all across North America. I have also served as chief financial officer for two of the largest transit agencies in the U.S., including the then-Southern California Rapid Transit District in Los Angeles, the third largest transit agency in the nation, when it was constructing and starting operations on the Long Beach-Los Angeles Blue Line light rail and the first phase of the Red Line heavy rail.

My resume is attached.

To summarize my attached comments, they demonstrate conclusively that the *Plan's* and DEIR's transit components will not only fail to achieve their stated objectives, but there is a very significant chance that they will be counter-productive. The Plan's transit components are simply a continuation of the Bay Area's past emphasis on expensive fixed guideway transit projects, an emphasis which has not increased transit ridership over the past thirty years. Rather, those programs have actually *decreased* transit ridership by 9% from 1980 to 2011, even as the taxpayer investment in such capital and operating costs, in constant dollars, have approximately doubled.

Given this unfortunate history, it is inconceivable that the *Plan*, through continuation and acceleration of these ill-advised programs and projects, will somehow reverse the long-term decline. Indeed, it is likely that attempts to implement the transit components of the *Plan*, besides proving fiscally impossible, will likely accelerate the decline in transit use and force more potential transit riders to automobiles. And in doing so, the *Plan's* transit components are likely to drive financially challenged residents – and those with jobs in the nine-county region that cannot afford to live here, a situation that is very unlikely to change from the ill-advised housing and land use concepts in the *Plan* and DEIR – to increase the utilization of old and poorly maintained vehicles that can easily have two to five times – or more – the carbon dioxide emissions per vehicle mile travelled of more modern automobiles, and multiples of that for other emissions, including PM_{10} and $PM_{2.5}$, NO_x, CO, O_3, etc.

The housing elements of the Plan, by eliminating almost all of the small remaining potential for new Bay Area residents to achieve their "American Dream" of a single family detached home in the nine Bay Area counties, and attempting to force them into high-density developments, will instead drive many of them to locate outside of the Bay Area counties and commute – primarily by driving – to jobs in the Bay Area.

For those jobs that remain, that is. Many employers, faced with great difficulty in attracting the types of employees they require, will continue the trend we've seen for many years of California and Bay Area employers relocating to areas more hospitable to business. This trend will accelerate if the high-density housing promoted in the *Plan* and DEIR is actually attempted to be implemented, as the capital and operating costs of such undesirable, but expensive, housing will require large taxpayer subsidies, making the already extremely high cost of doing business, and living, in the Bay Area far higher still. Yes, there are many people that want to live in the Bay Area, but, at some point, it is too expensive, in many ways, to even attempt to do so.

The transit ridership projections of the *Plan*, as well as the cost and service provided elements, *are simply not based on reality*, as this comment letter demonstrates indisputably with long-term trend time line graphics. The idea that decades-long negative transit trends (down for ridership and boardings per mile of service, upwards for costs and costs per mile and per boarding) will somehow not only halt their negative trends, but immediately reverse and shift over to strong positive improvement, is not viable on its face. This is especially true since the same policies and programs that led to the declines are continued in this *Plan*, and especially given that those prior policies and programs that failed to achieve their objectives were similarly sold to the public in the past with the same sorts of projections as those offered to public in this *Plan*.

As an additional test of the reality of the *Plan's* and DEIR's projections of transit and non-transit vehicle miles, I have compared what is being projected for the future of the Bay Area to what has been achieved by the American region that has had, for decades, the strongest commitment to "smart growth" and actively favoring of transit over roads – the Portland, Oregon-Washington urbanized area. While California and the Bay Area is certainly among the strongest states and regions in the U.S. in their commitment to smart growth, the Portland region clearly beats the Bay Area in this regard in virtually every possible way, from a very strong State-wide mandate for smart growth dating back four decades, the only directly-elected metropolitan planning organization board in the nation, heavily centralized land use and transportation planning, and enforcement powers that the most ardent smart growth/transit activists in the Bay Area can only dream of, etc. – but, yet, while Portland was able to actually achieve a 3.27% average annual rate of increase in transit utilization over the period 1989-2010, almost half-again higher than the 2.22% projected in the *Plan* and DEIR over the 2010-2040 period (which I find totally non-creditable), Portland still had a 2.18% average annual rate of increase in vehicle miles traveled, while the Bay Area expects to achieve .62% over 2010-2040 – two-sevenths of what Portland was able to achieve.

If Portland, with a strong advantage over the Bay Area in virtually every important attribute that could go into reduction of VMT, had over three-and-one-half times the average annual rate of growth in VMT that is being projected for the Bay Area, how can this possibly be logically explained?

I am also disappointed, but not surprised, that the *Plan* does not consider, or is there any evidence that its drafters ever considered, the most successful strategy for rapidly, and inexpensively, increasing transit utilization – reduction in fares plus improvements in quality and quantity of existing transit service, rather than extremely expensive, very long-term, major capital investments for fixed guideway transit. The three largest increases in transit ridership in the U.S. since World War II are all due to exactly this type of shift of emphasis in transit service, as I describe below.

Nor is there any evidence that MTC has even considered changes that will take advantage of the most promising new transportation technology since the beginning of the major increase in auto use at the turn of the 20th century: fully automated automotive travel – which, by the way, the Bay Area is one of the world leaders in developing.

For example, if MTC set as a goal that major Bay Area freeways would begin implementing automated vehicle-only lanes with the first one to be in place by a date certain, the capacity of such a lane in terms of both vehicles past a point per hour could be increased by a factor of two to three times or more – at higher speeds, which would mean that vehicle miles per hour per lane mile would increase by twice that or more. Safety would also increase substantially and, since wasteful stop-and-go would be significantly reduced, emissions of all types would be reduced – and, with the transportation energy/emission technology upgrades that have already been mandated by both the Federal and State governments, this would mean an ever greater advantage for the Bay Area as automobiles' existing national advantage over transit will continue to increase.

If this huge potential improvement is coupled with the widespread use of portable electronic devices, such as smart phones, for casual carpool matching, then average vehicle occupancy will also significantly increase, providing ever greater improvement potential for energy usage and emissions per passenger mile traveled.

Moreover, these improvements will be very low cost to taxpayers, as they will be chiefly matters of implementing the methodology on the lanes that are to be designated for fully-automated-vehicle-only use – but, since most to all of the technology to actually guide the vehicles will be ***in*** the vehicles, most of the cost of the technology will be paid for by the owners of vehicles, leaving planning, design, coordination, signage, public information, enforcement, and program/project management as the main public sector costs.

Further, since the use of the fully-automated-vehicle lanes will save significant travel time for users, it is very likely that users will be very happy to pay a fee for that privilege.

Overall, the concept has many similarities with MTC's HOT lane project – with the main differences being that fully-automated-vehicle-only lanes version will be far less expensive, in terms of public dollars, and will provide far higher benefits to more people.

Yes, while the technologies are already in wide-spread trial and testing, they is a long way from being proven in the marketplace as both technically proven and consumer acceptable, and while the change-over will be challenging, the failure of a transportation plan looking at least 27 years into the future to even mention this as a possibility that should be considered shows either an incredible failure to stay current on important transportation technology breakthroughs or an unfortunate, but very strong, wedding to the preferred ABAG/MTC way of doing things that no new developments will be allowed to challenge.

Therefore, I strongly recommend that an additional alternative be studied as part of the *Plan* and DEIR, a transportation improvement alternative, that consists of:

1. Expansion and improvement of existing transit systems, strongly emphasizing those modes that can be implemented quickly and with relatively low capital cost, including improvement of motor bus and vanpool services as outlined above, plus expanded transit service on new high-capacity automated vehicle lanes.
2. Major fare reductions, particularly for those types of services utilized primarily by the transit-dependent and economically challenged.
3. De-emphasis of expansion of expensive and low cost-effective rail transit and ferry service, using the funding saved for the other elements of this alternative.
4. Begin work to implement fully-automated, high-capacity, high-speed vehicle lanes on our freeway network, designed to take advantage of existing and emerging technologies, through a combination of conversion of existing lanes and addition of new lanes. Similar automated-only arterial lanes should also be considered. These lanes should be designed so that transit vehicles, including those in developing modes, can take maximum advantage of them.
5. Studying how casual carpooling through real-time matching through portable electronic devices can be advanced to both reduce vehicle miles traveled by

increasing average passenger load and provide additional transportation opportunities for the transportation-disadvantaged. It should be understood that the government role in this should be largely one of ensuring that a proper legal and regulatory structure is in place to allow innovation, while providing for safe and secure usage, is the goal – and that, to a large extent, the role of government is to get out of the way and watch it happen.

6. Actions in Sacramento and Washington, DC to advocate for flexibility in transportation funding to emphasize the objective of cost-effective and productive transportation outcomes, rather than designated funding sources that can only be used for specified types of capital projections.

I submit that all of the above are technically, legally, socially, and financially viable for large-scale operations well before the end of the 2040 period for the *Plan* (in fact, I believe that these are far more likely to succeed than the transportation and housing elements now in the *Plan* and DEIR. The biggest risk of failure is that the transportation and land use powers-that-be in the Bay Area will actively and/or covertly oppose these proposals, which will fully achieve the transportation objectives of SB375 and other requirements without the substantial disruption of the current preferred *Plan* alternative to what makes the Bay Area great, and at far lower cost to the taxpayers, and far lower risk of massive failure.

Unfortunately, despite what many people would like to believe, *transit in the U.S. does not use less energy, or produce fewer emissions, than current generation automobiles*, and the upcoming improvements in automotive technology will mean, by the end of the *Plan* period in 2040, the fleet of automobiles on the road will have a very significant advantage in these regards over transit. What this means is that the only way for transit to make a positive contribution to reductions in energy usage and emissions is for transit to do what it does best, serve first the transit disadvantaged, those whose alternative to transit is a very dirty and energy-inefficient car, and spend far less effort, and funds, trying to attract higher-income residents out of very clean and energy-efficient vehicles – at a far higher cost per passenger.

Due to ABAG's and MTC's astonishing failure to produce credible and honest models for the *Plan* and DEIR, sales of motor fuels are projected far too high, which means that the user fees and taxes imposed on these fuels are also significantly overstated, and thus the *Plan's* revenue projections are materially and fatally overstated. In addition, the generation of CO_2 is significantly overstated in the Plan's analyses because the quantity of fossil fuels required for a vehicle to travel one mile will be significantly less than the *Plan* anticipates—a fact that MTC and ABAG well know, but have chosen to not disclose to the public in their analysis of the *Plan* except for those readers who have managed to dive deeply into the details, find the key discussion, and then were able to translate it from planner-speak into English.

This failure to utilize the best available data – which is required by the law of the land, as well as common sense and basic principles of stewardship of taxpayer funds – means that *the Plan and DEIR are not based, as they must be, on reasonable assumptions*. Financially, this means that many of the projects that are included in the *Plan* and DEIR will not be implemented because there will be a significant funding shortfall – which will be made worst by the Bay Area's long and sad record of significant overruns on major transportation projects, such as the East Span of

the Bay Bridge, BART to SFO and San Jose, the Oakland Airport Connector, etc. – as I have described below.

If MTC, the rest of the Bay Area transportation decision-making community, and the State of California, persist in their past patterns of funding poor projects as this *Plan* and the DEIR strongly indicate they intend to, the increase in congestion (production of CO_2 and other emission per vehicle mile travelled increase significantly when that mile is in intense, stop-and-go, traffic) could actually lead to significantly increased emissions to the point of overcoming the reductions in emissions from transportation technology improvements – all while ignoring more productive programs such as transit fare reductions, simple improvement to the quality and quantity of existing transit services, and adequately maintaining the roads that, even if the *Plan*'s and the DEIR's significantly overestimated projections of huge increases in transit utilization could somehow come into being, would still provide the overwhelming majority of passenger-miles in the area, as well as almost all of the local ton-miles of goods movements

These negative outcomes, which are readily apparent to anyone who studies the data and the proposals, constitute a violation of the National Ambient Air Quality Standards of the State Implementation Plan under the Clean Air Act, 42 USC 7506(c)(1)(A)-(B).

At this point in time, it is not possible to state with any degree of certainty at all what the outcome of the proposals in the *Plan* and the DEIR will be. The assumptions built into the models on almost every topic – fuel mileage, cost of transit, attractiveness of transit, attractiveness of high-density development, a very high population growth rate, overestimation of financial resources, underestimation of costs, and more – are so far divorced from reality that the one thing that can be stated for certain is that we do not know what the future will look like, but we do know it will not look anything like the vision portrayed in the *Plan* and DEIR.

The only reasonable action to take at this point is to start over – and, this time, do it right, based on the world as it exists and is actually likely to exist in the future, not the world as someone would like the world to exist.

Sincerely,

Tom Rubin

Thomas A. Rubin

Attachments

COMMENTS ON

THE ASSOCIATION OF BAY AREA GOVERNMENTS' AND THE METROPOLITAN TRANSPORTATION COMMISSION'S

DRAFT PLAN BAY AREA (*PLAN*), MARCH 2013, AND *ENVIRONMENTAL IMPACT REPORT PLAN BAY AREA DRAFT*, APRIL 2013

THE IMPACT OF FARE REDUCTION AND SERVICE IMPROVEMENT ON EXISTING TRANSIT SERVICE ON RIDERSHIP EXPANSION

The *Plan* and DEIR do not examine the single most powerful tool available to transit agencies to improve transit utilization in mature transit regions (those where, by U.S. standards, there has been a high level of transit utilization for an extended period of time): fare reductions, particularly those coupled with quality and quantity improvements in existing transit services, as opposed to expensive – and very slow to implement – major guideway transit projects, particularly new rail lines.

Why has MTC failed to study this extremely promising, far less expensive, and far faster to implement, alternative?

Fare reductions are particularly important in air quality matters because, to a large part, they attract existing riders and marginal transit dependent riders to shift from automotive trips. Rather than attempting to attract high-income residents to leave their late model fuel-efficient and low emission automobiles at home and take transit with massive public subsidies per passenger mile and limited or no benefit environmentally, the types of riders that fare reductions and improvements to existing transit service attract are primarily those who would otherwise either not take the trip at all or – more predominantly – utilize very old, and very dirty, cars and other light duty vehicles for their trips. These vehicles, being designed to far older standards than modern vehicles and, most frequently, being very poorly maintained, can easily produce two to three times, or more, the CO_2 per vehicle mile travelled and dozens, often hundreds of times, the other emission factors, including PM_{10}, $PM_{2.5}$, NO_x, O_3, ROG, etc. of more modern, and better maintained vehicles. In fact, it is very questionable if transit has any air quality advantages ***at all*** over modern light-duty vehicles[1], so getting people out of junkers and taking them of the streets is really the only way that transit can make a measurable contribution to air quality. In addition, providing transit service to lower income residents for whom transit is either a necessity or a viable alternative to passenger vehicle use is a much more justifiable use

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[1] Randal O'Toole for Cato Institute, *Does Rail Transit Save Energy or Reduce Greenhouse Gas Emissions?*. April 14, 2008: http://www.cato.org/publications/policy-analysis/does-rail-transit-save-energy-or-reduce-greenhouse-gas-emissions
Thomas A. Rubin for Reason Foundation, *Does Bus Transit Reduce Greenhouse Gas Emissions?,*" April 5, 2010: http://reason.org/news/show/does-bus-transit-reduce-greenhouse
This topic is discussed in greater detail in the "Transit Does Not Use Less Energy …" section below.

of public funds than massive public subsidies per passenger mile for rail or light rail for higher income residents with limited or no environmental benefits.

When fare reductions are combined with improvements in pre-existing transit service, the likely outcome will be even greater increases in transit ridership. Those improvements in pre-existing transit service include such relatively inexpensive and easily-implementable policy initiatives such as quantitative improvements such as more frequent service on existing transit lines, longer hours of service, more Saturday/Sunday/Holiday service, lengthening and route variations on existing bus lines, and new bus lines; as well as qualitative improvements, such as reduction in overcrowding, newer transit vehicles, better maintenance (which leads to fewer missed assignments and in-service breakdowns and better schedule compliance), cleaner vehicles and stations, and improved safety and security. And, in many cases, qualitative and quantitative improvements are accomplished by the same actions.

Interestingly, *while this transit service improvement option provides both far lower cost and easier to implement and faster results than the expensive initiation and expansion of rail and other guideway transit systems*, there are very few examples of this even being attempted in the American transit industry over the last several decades. *It is simply not an alternative that is even considered in long-range transportation planning* – perhaps it does not match well with the pre-conceived "solutions" of transit agency and metropolitan planning organization senior executives and governing board members. But the public as a whole bears the cost of those ill-advised and unworkable preconceived "solutions," and the citizens who suffer the most are the lower-income, transit-dependent residents whose transit needs remain ignored and unconsidered.

What makes all of this more remarkable is that the evidence for the above is indisputable and easily discernable by anyone who wishes to inquire into what works to expand transit use cost-effectively (or into what will even expand transit use at all, regardless of the amount of public funds that are expended). The top three transit ridership expansions in the U.S. since World War II have all been, in whole or in large part, due to fare reduction/pre-existing service expansion-improvement, including:

- The 36% reduction in inflation-adjusted fare/unlinked passenger trip (UPT) that occurred for Metropolitan Transportation Authority-New York City Transit from approximately 1993 to 2007, which had a major role in producing an 81% increase in transit ridership – and which immediately followed a decline of 39% over the prior nine years, when there was a 48% increase in fare/UPT.
- The remarkable series of increases in fare/UPT and decreases in UPT, and vice versa, for the Southern California Rapid Transit District/Los Angeles County Metropolitan Transportation Authority between 1980 and 2011:

    - 1980-82 – Full adult cash fares increase from 55¢ to 65¢ to 85¢ in two years (in all cases, here and below, other fares generally move closely proportionally to the changes in cash fares) – and UPT drops 11%.
    - 1982-85 – Cash fares drop from 85¢ to 50¢, and stay there for three years – and UPT climbs over 40%.

- 1985-1996 – Cash fares return to 85¢ for 1986, then to $1.10 for 1999 and $1.35 for 1996 – and UPT drops 27%
- 1996-2007 – The cash fare stays at $1.35, but the all-important $42 monthly pass returns, along with a new $11 weekly pass, and substantial expansions and improvements in bus service result in UPT increasing 35%.
- 2007-2011 – Reductions in bus service and increases in fares lead to a 5% reduction in UPT

Southern California Rapid Transit District/Los Angeles County Metropolitan Transportation Authority

The Southern California Rapid Transit District (SCRTD) operated the bus transit system, and later the light rail and heavy rail systems, in Los Angeles County until the merger with the Los Angeles County Transportation Commission (LACTC) (the transportation planning and funding agency for Los Angeles County) to form the Los Angles County Metropolitan Transportation Authority (MTA) in the first part of calendar year 1993.

Transit usage in Los Angeles over this period offers an almost unique opportunity to track the impact of fare changes and improvements in quality and quantity of transit service on transit utilization. We will track SCRTD/MTA ridership, specifically unlinked passenger trips (UPT)[2], over the period 1980-2011[3], as shown in the graphic following.

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[2] Transit trips are generally defined two ways, as linked and unlinked passenger trips. To define these by example, if a rider takes a bus from his/her home to a BART station, then BART to his/her job, that is two unlinked trips and one linked trip.

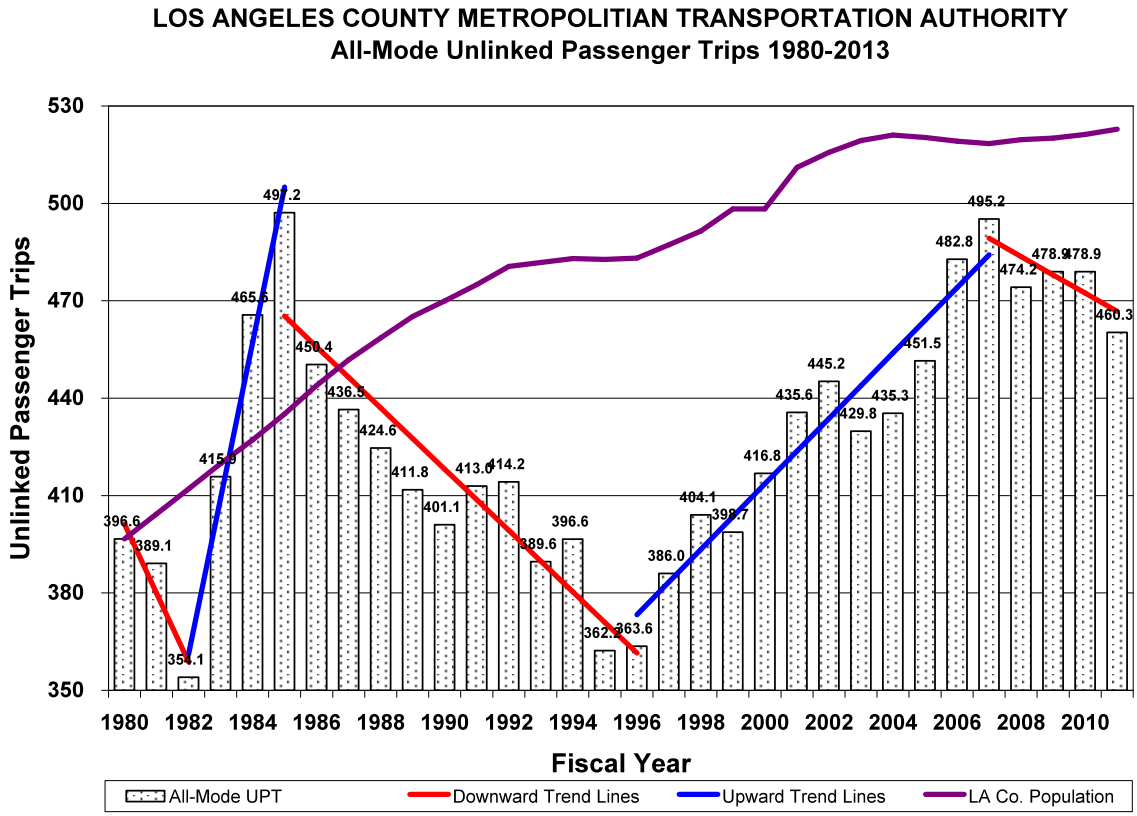
As most transit agencies have had no mechanism to track linked trips, UPTs have been the established standard for reporting transit ridership for well over a century.

[3] Federal Transit Administration (FTA) (then Urban Mass Transportation Authority [UMTA]), *Data Tables for the 1985 National Transit Database Section 15 Report Year*,

SCRTD/Metro Section 15/National Transit Database (NTD) reports to UMTA/FTA for 1982-2002; NTD "Profiles" for Metro for subsequent years.

The data in the graph does not adjust for labor actions against SCRTD that shut down operations for five days in the 1983 reporting year [SCRTD/MTA have June 30 fiscal year ends], twelve days in 1995 [MTA operated approximately one third of its transit service with management personnel during this action] 33 days in 2001, and 35 days in 2004. Michael H. Cimini and Charles J. Muhl, "Los Angeles Strike Ends," *Monthly Labor Review*, Volume 114, 1994, accessed May 7, 2010: http://www.questia.com/googleScholar.qst;jsessionid=L1YSCghH8vwjj47ZDJf9rnzsVKTjpBbV2hM7nyLPJ8mVJlX7vLQd!1893792638!1707999068?docId=5000287759,

Edmund D. Edelman and Daniel J.B. Mitchell, *Dealing With Public-Sector Labor Disputes: An Alternative Approach For California*, Table 3: Strikes at the Los Angeles Metropolitan Transit Authority – LAMTA (1958-1964), Southern California Rapid Transit District - SCRTD (1964-1993) and Los Angeles County Metropolitan Transportation Authority – LACMTA (1993-Present), accessed May 7, 2010: http://www.spa.ucla.edu/calpolicy/files05/CPO-MTAp.pdf



- 1980-1982 – During the latter part of the 1970's, due primarily to the price and uncertain availability of motor fuel following the reaction of the Arab oil producing nations to the outcome of the 1973 Yom Kippur War between Israel, Egypt, and Syria, and the rapid influx of Hispanic immigrants who were transportation-disadvantaged, SCRTD transit ridership rose rapidly, funded primarily by the one-quarter cent sales tax authorized by the Transportation Development Act of 1971. However, funding shortfalls led to an increase in SCRTD cash fares from $.55 for fiscal year 1980 to $.65 for 1981 and then $.85 in 1982, with other fares changing approximately accordingly, resulting in an 11% reduction in UPT.
- 1982-1985 – Following the passage of Proposition A[4], the first (of three) half-cent sales taxes primarily for transit in Los Angeles County, in accordance with the terms of the Proposition, SCRTD adult cash fares were reduced from $.85 from $.50, and other fares reduced proportionately, for the three year period, 1983-85. Ridership (UPT) increased slightly over 40%, with peak period ridership up over 36%, despite vehicle revenue miles only increasing 1.5%[5].
- 1985-1996 – During this period, the LACTC, again in accordance with the terms of Proposition A, ceased using part of the Proposition A funds for the SCRTD fare reduction program and shifted emphasis to planning, design and construction of rail

[4] LACTC Ordinance 16, presented to the voters as Proposition A, November 1980 election, not to be confused with Proposition A of 1998, a ballot initiative presented to and passed by the Los Angeles County electorate which prohibited the utilization of local sales tax revenues for the construction of future subways.

[5] SCRTD Section 15 reports to UMTA, 1982 and 1985.

transit (during the three years of the 50-cent fare, slightly under 20% of the total Proposition A sales tax revenues, or slightly less than the value of a 0.1% sales tax, had gone for this purpose).[6] Two light rail lines and part of the heavy rail system went into service during this period. As the adult cash fares increased from 50¢ in 1985 to 85¢ in 1986 to $1.10 in 1988 and $1.35 in 1994, SCRTD UPT declined approximately 27%[7].

- 1996-2007 – As a direct result of the 1994 fare increase passed by the MTA Board – which was to include the elimination of monthly passes, which were extensively utilized by transit-dependent riders and, therefore, would have amounted to approximately a doubling of average fares[8] – a major Federal Title VI (discrimination in the utilization of Federal funding) legal action was filed against Metro. This produced a Consent Decree, which remained in force for approximately eleven years[9]. The Consent Decree (CD) required Metro to reintroduce the $42 monthly transit pass, institute a new $11 weekly pass, increase bus service to reduce extreme bus overcrowding, and add additional bus lines[10]. After eleven years of losing an average of twelve million UPT a year, the Consent Decree requirements not only immediately stopped the loss, but turned it around, producing an average annual increase of twelve million UPT annually – a 36% increase over this period. While Metro rail ridership did increase significantly during the 1996-2007, period, 58% of the added riders were bus riders and approximately 70% of the new rail riders were former bus riders[11]. Using the Federal Transit Administration (FTA) "new

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[6] Author's personal files as Chief Financial Officer of SCRTD during this period.

[7] *Ibid*.

During this period, through other actions of LACTC, former SCRTD transit lines with ridership of approximately ten million annual riders were transferred to other Los Angeles County transit agencies. Adjusting for these shifted riders, SCRTD ridership declined approximately 25%. (Author's personal files.)

[8] LA Metro, fiscal year 1995 Budget Proposal documentation.

[9] *Labor/Community Strategy Center et al v Los Angeles County Metropolitan Transportation Authority et al*, [No. 94-5936 TJH (MCX)] (*L/CSC v MTA*).

[10] From the first year of Section 15/NTD reporting in 1979 to well into the Consent Decree period, SCRTD/Metro bus service had the highest average passenger load of any major city bus operator in the nation. As a result of the Consent Decree overcrowding reduction service, Metro average bus passenger loads fell to second highest, after NYC. *NTD.*

[11] National Transit Database (*NTD*)

SCRTD/LACTC/LA Metro, Environmental Impact Statements/Reports for various rail lines, comparisons of projected new transit riders to total rail riders. Such projections for all new guideway transit lines opened during this period are not available, but for those that are, and for later proposed guideway transit projects, the results are fairly consistent:

Metro Gold Line Eastside: 8,600 new riders out of 23,000 average weekday boardings, 2020 – 37% new riders, U.S. Department of Transportation/Federal Transit Administration, *Proposed Allocation of Funds for Fiscal Year 2005—Annual Report on New Starts* ("*Annual Report 2005*"), "Metro Gold Line Eastside Extension" (November 2003), page A-117, accessed April 30,2013:
http://www.fta.dot.gov/12304_3116.html

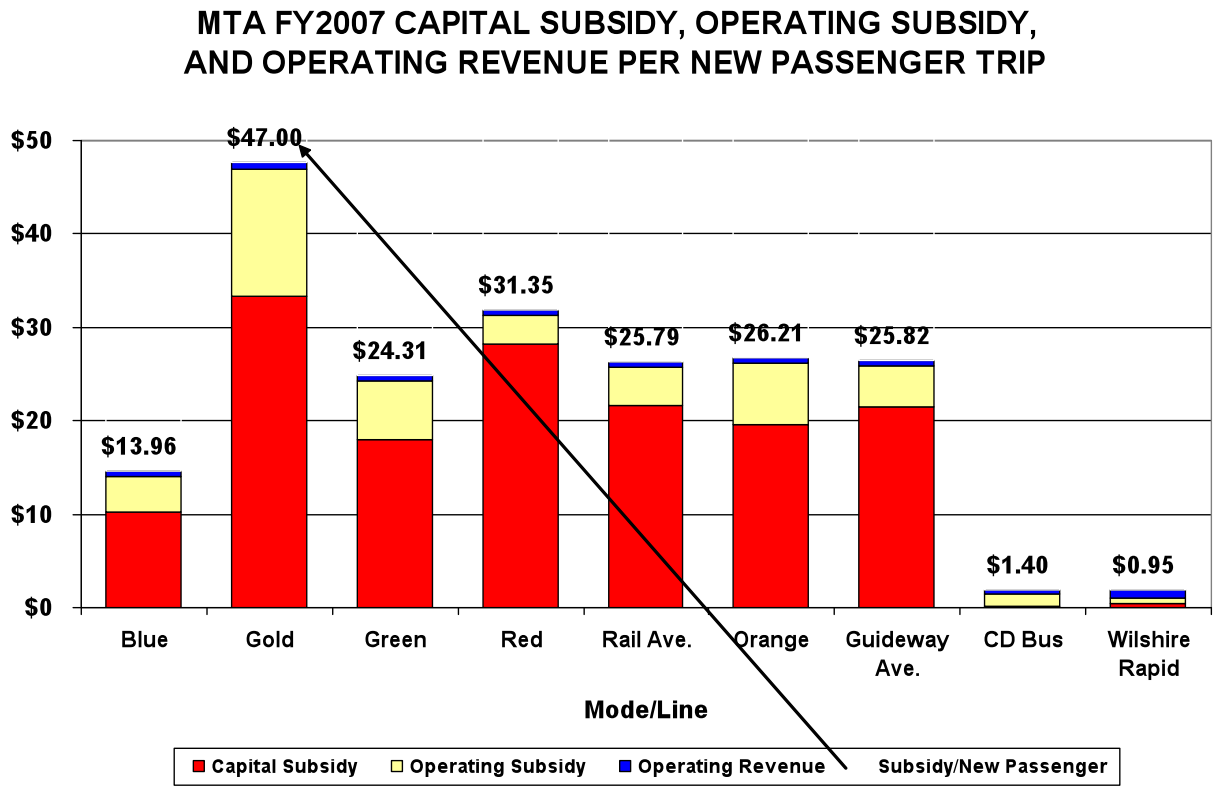
Mid-City/Exposition LRT Project: 20,400 new riders out of 43,600 average weekday boardings, 2020 – 47% new riders, *Annual Report 2005*, "Mid-City/Exposition LRT Project," page A-261 (*ibid.*)

San Fernando Valley East-West Transit Corridor, 6,300 new riders out of 24,700 average weekday boardings, 2020, *Annual Report 2003*page A-295, accessed April 30, 2013:
http://www.fta.dot.gov/12304_2635.html

Regional Connector Transit Corridor, 16,460 new riders out of 88,440 average daily trips 2035 – 19% new riders, *Annual Report 2014*, accessed April 30, 2013:
http://www.fta.dot.gov/12304_15153.html

(continued)

starts" methodology for annualizing costs, the average taxpayer subsidy per new passenger, expressed in FY07 dollars, was $1.40 for the bus riders added by the Consent Decree, vs. $25.82 for the added guideway transit (Blue, Gold, Green, Orange and Red Line)[12], a taxpayer subsidy per new passenger ratio of 1:18.4 – that is, adding transit trips via bus only required a taxpayer subsidy of 5.4% of the cost of adding transit trips via guideway transit (rail and dedicated busway surface bus rapid transit).



The *L/CSC v MTA* Consent Decree also produced the unique situation where the question of the value of transit improvements through expensive investments in new rail transit systems vs. the value of transit improvements through inexpensive – and far more productive – improvements to the pre-existing bus system was presented to the American judicial system for an evaluation of their relative values – and the judicial system found in favor of improvements to the bus system.

Westside Subway Extension Section 1, 7,700 new riders out of 16,800 average weekday trips 2035 – 46% new riders (*ibid.*)

Five project totals: 59,460 new riders out of 196,540 average weekday boardings – 30% new riders.

It should also be noted that SCRTD/MTA has had a fare policy that makes long trips on guideway transit less expensive than similar trips on express bus routes. For example, when the first new Los Angeles rail line, the Long Beach-Los Angeles Blue Line, opened in 1990-91, the end-to-end fare on the Blue Line was a "flat" fare of $1.10 (full adult cash fare), while the comparable fare on the two express bus lines from Long Beach to downtown Los Angeles included four and five "zone" charges of $.40 each, making the comparable bus fare $2.70-3.10. A model run by SCRTD at the time projected that the Blue Line ridership with the higher zone fare structure would be 47% of the ridership under the flat fare that was implemented; it was impossible to test the accuracy of the zone fare model run, but the flat fare ridership projection was within the sampling error of the actual ridership.

[12] "Comments of Thomas A. Rubin to the California State Assembly Select Committee on Rail Transportation," Los Angeles, April 25, 2008.

Donald T. Bliss, Esq., former Acting General Counsel and Deputy General Counsel of the U.S. Department of Transportation, the Special Master appointed by Senior Judge Terry Hatter of the Central District of California to resolve issues related to the implementation of the Consent Decree, so found in his ruling regarding the amount of bus service that MTA would have to add to come into compliance with the load factor reduction elements of the Consent Decree[13].

Although the legal question was decided by Special Master Bliss on the basis of language of the Consent Decree, the plaintiff and defendant both presented detailed arguments by their transportation experts on the transportation impacts of the Consent Decree, arguing for and against MTA actually having to live up to what was, in essence, the contract it had entered into and the court had approved. Special Master Bliss evaluated these and his ruling clearly found that the bus service improvements mandated by the Consent Decree not only were legally required, but had significant demonstrable transportation benefits over and above MTA's proposed alternative utilization of the funding required for Consent Decree compliance.[14]

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[13] U.S. Department of State, Biography of Donald T. Bliss, Ambassador, International Civil Aviation Association, accessed May 10, 2010:
http://www.state.gov/outofdate/bios/75686.htm

[14] *L/CSC v MTA,* Proceeding Before Special Master Donald T. Bliss – Memorandum Decision II And Final Order On Remedial Service Plan To Meet 1.25 And 1.20 Load Factor Target Requirements, January 12, 2004, footnote 22, page 32:
"MTA's new management apparently is not pleased with the way the Consent Decree entered into by its predecessors has been implemented. In his declaration, David Yale states that "the Consent Decree has had no benefits that could not have been achieved without the Decree, and it has diverted significant financial resources in process to questionable bus service expansions," Yale Decl. 19, which are "a poor investment of scarce public funding." Id. 17. Moreover, according to Mr. Yale, "the Consent Decree has, and will continue to have, detrimental impacts on the Regional Transportation System in Los Angeles County for many years to come." Id. 4. Without the Decree, Mr. Yale states that the MTA "would have had additional financial resources" for highway construction. Id. Mr. Yale candidly acknowledges that "the MTA has carefully developed a short range plan that balances these needs as best it can under the constraints of the Consent Decree ...." Id. (emphasis added). However, Mr. Yale continues, "any further unanticipated financial changes that are needed for the Decree will have to be undone as soon as the Decree expires in early FY 2007…." Id. (emphasis added).
"Given these views on the alleged shortcomings of the CD presented by an MTA planning official in the record of this proceeding, it is all the more imperative that the MTA commit to a specific bus capacity expansion program that will provide lasting improvements in the quality of bus service for the transit-dependent -- in accordance with the letter and spirit of the CD -- beyond the expiration of this Decree. It should be noted that Mr. Yale's views present an interesting contrast to what the MTA staff apparently wrote, at least with respect to the procurement of new buses, in a briefing for the MTA Board on the Consent Decree. The staff outlined the benefits of compliance with the Decree, including the transformation of the MTA bus fleet from "the oldest to the newest fleet of major bus companies," and stated that "MTA's new buses are worth every penny." See Declaration of Thomas A. Rubin Re Consent Decree Costs at Attachment II (Oct. 14, 2003) ("Rubin Decl. Re Consent Decree Costs") (briefing update on Consent Decree prepared by MTA staff dated September 19, 2002).
"Furthermore, the BRU and its expert, Thomas Rubin, who have been sharply critical of the MTA's implementation of the Decree, also have presented a more positive view of the benefits achieved by the Decree in improving bus service for transit-dependent riders, which is, after all, the singular purpose of the Decree. In his Declaration Re Reallocation of MTA Funds, Mr. Rubin analyzes in detail the effects of the Consent Decree, finding that in the six-year post-Consent Decree period, the MTA has gained a total of 81.6 million annual riders. Rubin Decl. Re Reallocation of Funds 23. According to Mr. Rubin, MTA ridership increased from 364 million in 1996 to 445 million in 2002, resulting in an increase in total fare revenues of $100.5 million over the six-year period. Rubin Decl. Re Consent Decree Costs at 3. This in stark contrast to a loss of 133.6 million annual passengers over the eleven year period preceding the Consent Decree. Rubin Decl. Re Reallocation of Funds 23. Mr. Rubin also shows
(continued)

New York Metropolitan Transportation Authority-New York City Transit

The New York Metropolitan Transportation Authority (NYMTA) is the overall transit planning, funding, and operating agency for most of New York City transit, responsible for New York City Transit (NYCT), the largest transit operator in the nation, as well as the Long Island Railroad, Metro-North Commuter Railroad, certain smaller – but still large by national standards – transit agencies, and the MTA Bridges and Tunnels, the former Tri-Borough Bridge and Tunnel Authority.

At the beginning of the study period in 1982, NYCT, as well as the other New York MTA transit agencies, were beginning to emerge from an intense recapitalization effort that reversed decades of underinvestment and neglect[15]. Significant improvements were being made in both the quality and reliability of transit service, as well as other aspects important to riders such as security, cleanliness, and graffiti reduction.

However, it appears that another major factor was the adoption by the MTA operators of more technically modern fare collection equipment, which enabled various types of multi-ride fare media including transfers and monthly passes to be used for the first time by NYCT. All MTA agencies could use the same fare media[16]. This caused the average fare per boarding for heavy transit users to decrease over time in constant dollar terms, even as the published single ride fares were experiencing nominal increases. The use of multi-ride fare media encouraged users to take additional rides; with these new passes there was no out-of-pocket cost for taking a bus for the half-mile from the subway station to the job site. The new equipment and fare media were implemented over a period of years, beginning with the first limited test in 1993 through

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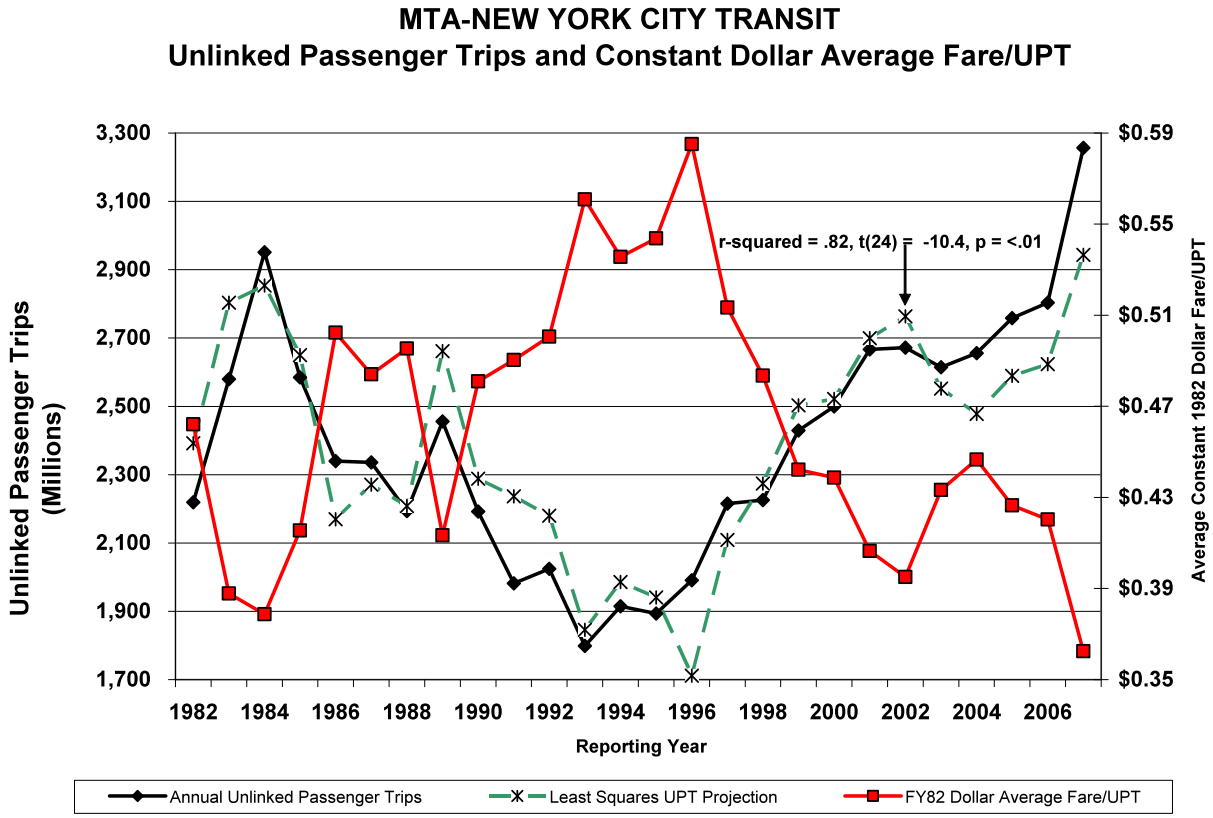
that, even taking into account what he views as "extremely overstated" Consent Decree expenditures per new rider, the cost per new rider -- 83% of whom are bus riders -- is still far below other transit modes. Id. 25, 26, 28. Mr. Rubin describes other benefits of the Consent Decree: "The [Consent Decree] has made great progress in reducing overcrowding, and pass-by's, on MTA bus routes . . . MTA service has also become more reliable and the condition of MTA's bus fleet improved substantially as the average age has decreased. The fares to ride MTA bus and rail have been kept low for MTA's huge numbers of extremely low-income riders. The service added for CD compliance has meant shorter headways, and the reduced overcrowding has decreas[ed] running times, speeding travel for these bus riders. The Rapid Bus Program, which MTA has claimed as a [Consent Decree] cost . . . is another significant benefit for bus riders. Many new bus lines have begun service. The speed-up of bus replacement has meant cleaner air for all Los Angeles County residents …. All in all, hundreds of thousands of MTA bus and rail riders each day, and many more non-transit users, are receiving benefits in lower cost transit; a faster, higher quality, and more reliable transit experience; access to new destinations; and improved environmental quality and traffic flow – all due to the workings of the [Consent Decree]." Id. 27.
"Hopefully, these benefits are not the temporary results of a "short range plan" due to expire at the end of the Consent Decree but rather are permanent improvements in the quality of bus service that will be sustained well beyond the Decree's expiration."

[15] Mark Seaman, Allison L.C. de Cerreño, and Seth English-Young, *From Rescue to Renaissance: The Achievements of the MTA Capital Program 1982-2004*, December 2004, NYU Wager Rudin Center for Transportation Policy & Management, accessed June 14, 2010: http://wagner.nyu.edu/news/rescue.pdf

[16] *Ibid*., pp. *i*, *iii*, *iv*, 1, 9, 10, 16, 17, 27, 29, 30-31, 35, and 36.

substantial completion in 1997-1999[17]. MTA ceased selling the world-famous subway tokens in 2003[18].

The following graph shows the close relationship between average fare per boarding and unlinked passenger trips over the study period[19].



Because our hypothesis is that inflation-adjusted average fares (the solid red line above) and ridership, expressed in UPT (the solid black line) have an inverse relationship – as average fare goes up, ridership goes down, and *vice versa* – the graph uses simple (ordinary least squares)

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[17] Faison, Seth (June 2, 1993). "3,000 Subway Riders, Cards in Hand, Test New Fare System," *The New York*, June 2, 1993, retrieved May 14, 2010: http://query.nytimes.com/gst/fullpage.html?res=9F0CE7DC143BF931A35755C0A965958260,
Seaman, de Cerreño, and English-Young, page 10,
Newman, Andy, "Hop On, Hop Off: The Unlimited Metrocard Arrives," *The New York Times*, July 3, 1998, retrieved May 14, 2010: http://query.nytimes.com/gst/fullpage.html?res=9B00E4DE173EF930A35754C0A96E958260,
Williams, Monte, "Metrocard Machines' Subway Debut". *The New York Times*, January 26, 1999, retrieved May 14, 2010: http://select.nytimes.com/gst/abstract.html?res=F10810FD395D0C758EDDA80894D1494D81.

[18] Markowitz, Michael, "NYC Subway Token, 1953-2003," *Gotham Gazette* , April 28, 2003, retrieved May 14, 2010: http://www.gothamgazette.com/article//20030428/202/362.

[19] Fare revenue and UPT from *NTD*, inflation adjustment factor is Consumer Price Index-All Urban Consumers, New York-Northern New Jersey-Long Island, NY-NY-CT-PA, Series Id: CUURA101SA0, CUUSA101SA0, accessed May 12, 2010: http://www.bls.gov/cpi/

regression to project the expected UPT from the average fare (dotted green line). The statistic line above shows the "r-squared" – the coefficient of determination – of .82, which can be interpreted as, the change in inflation-adjusted fare/boarding explains 82% of the change in UPT[20].

Despite the good "eyeball" fit between the black and green lines above, and the high $r^2 = .82$, this is another example of the old adage that "correlation is not causation" – or, more properly, that while the change in fare media and price almost certainly was *a* causation, and arguably a very significant one, there were a very large number of things going on at this time that were also major influences. One interpretation, obviously somewhat simplistic, is that the improvements in the transit system infrastructure were the underlying *necessary* condition for the *sufficient* condition of the fare level decreases to be effective in generating more unlinked transit trips.

Due to the effective decrease in transit fares/boarding – and other factors – from the low point in 1993 through 2007, NYCT UPT increased 83%, or 1.231 billion boardings. *This accounted for 61% of the total national increase in transit UPT over this period, a stunning indicator of (1) the lack of efficacy of transit expenditures nationwide which are generally consistent with the rail-heavy transit "investments" proposed in Plan Bay Area, and (2) the efficacy of reducing fares and increasing service quality for transit modes, especially buses, that are primarily used by transit-dependent low-income residents*[21].

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[20] For non-statisticians, at the risk of over-simplifying, the "*t*" statistic, or Student's *t*-value, of -10.4, along with the 24 degrees of freedom (26 observations – 2) is used to determine that the "*p*" (probability) value of the actual result being outside of the range of what is being predicted is less than 1%, meaning that there is high likelihood that the relationship calculated is valid.

[21] APTA, *2010 Public Transportation Fact Book, Appendix A: Historical Tables*, Table 1, "Unlinked Passenger Trips by Mode," accessed May 14, 2010: http://apta.com/resources/statistics/Documents/FactBook/2010_Fact_Book_Appendix_A.pdf

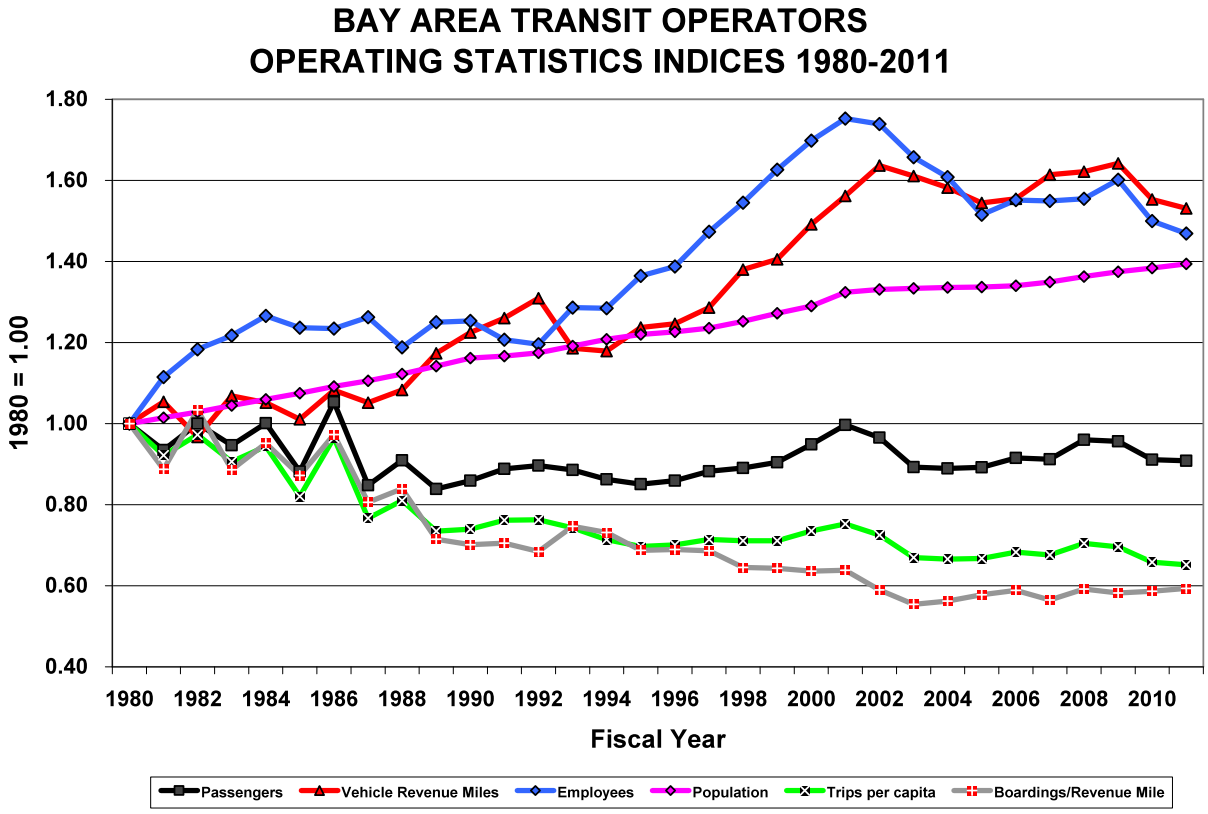
THE TRANSIT EXPANSION PROJECTED IN THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE BAY AREA PLAN IS OUT OF TOUCH WITH REALITY

MTC Proposes a Continuation and Expansion of the Failed Policies and Programs of the Past – Yet, Remarkably, Projects in *Plan Bay Area* a Reversal of the Long Term Reduction in Transit Utilization in the Bay Area

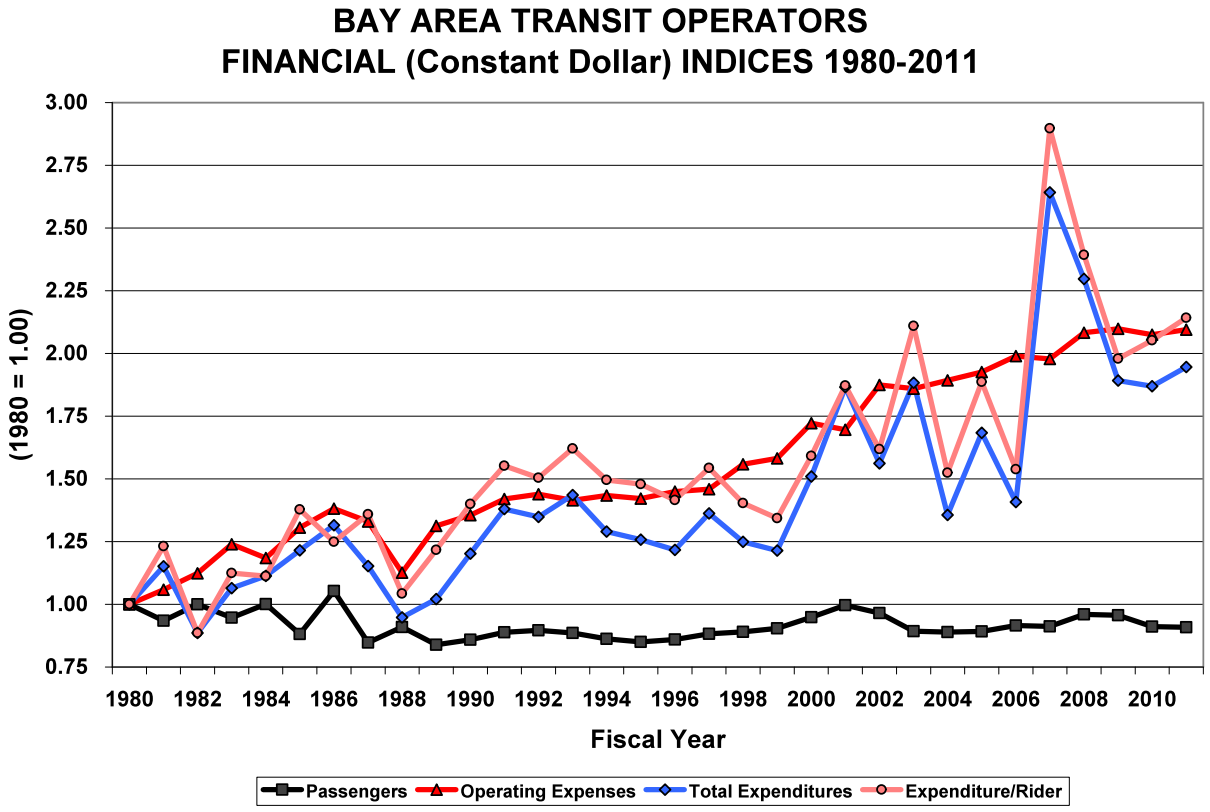
This and the following portions of this comment letter will focus on the way that things work in the Bay Area as a whole.

While it is clear that MTC does not control everything that occurs in the Bay Area, or even the Bay Area transportation programs as a while, it is not at all unfair to bring up the history of transportation planning, funding, construction, operation, capital renewal and modernization, and utilization in the Bay Area ***in total*** in making these comments. It is precisely the same political and other considerations that led to major difficulties in the past that will also make the transportation planning, funding, construction, operation, capital renewal and modernization, and utilization in the Bay Area in the future exceedingly unlikely to turn out differently than past failed efforts.

Let us being by quantifying transit in the Bay Area over the past three-plus decades. As explained in detail in the Appendix, I have used U.S. Department of Transportation and MTC's own statistics to develop these charts:



As can be easily seen in the above, during the period 1980-2011, the Bay Area (nine Bay Area counties in total) population has increased almost 40% and transit vehicle revenue miles (miles that buses, rail cars, ferries, and other transit vehicles are in service to the public) and transit employees have increased approximately 50%, yet total transit ridership (UPT) has decreased by 9% – and, more important, UPT *per capita* has decreased 35% and boardings per vehicle revenue mile have decreased by 41%.



These dismal results have not been due to lack of funding – as the above chart shows, the 9% decrease in total UPT has happened even though transit operating expenses have gone up 109% and total expenditures (including capital expenditures, which can vary far more widely than operating expenses from year to year) have gone up 95% ***in inflation-adjusted dollars***. Total expenditures per rider and per vehicle revenue hour both went up approximately 110%. As a lower share of costs are covered by transit fares and other operating revenues, the taxpayer burden has gone up even faster.

In sum, the record of transit in the Bay Area over the 32-year period, 1980-2011 is one of spending more and more taxpayer dollars to achieve less and less in terms of people moved – and of continuing to repeat the same failed policies and practices over and over again, despite the demonstrably failed results of these in the past..

Now let us look at MTC projections for the year 2040, and the average annual percentage changes over that period to get us there – but, before we do, a note of explanation: *There is astonishing little data in the Plan*, its published supporting documents, and even in the huge volume of documents that MTC has provided us when we asked for additional information, that

sets forth the details of the *Plan*. In fact, about the only data that is available is 2040 data for population, transit riders, and transit modal seat-miles, with comparable 2010 data, and total transit expenditure data for the entire plan period. We were unable to even find the specific inflation assumptions in the *Plan*[22].

In an attempt to show the anticipated outputs of the *Plan*, as presented, I made several simplifying assumptions to prepare the graphs below (in preparing such plans, those preparing them do not generally individually model each year in the plan, in this case, the twenty-seven years between 2013 to 2040; instead, the usual practice, which appears to be what ABAG and MTC have done, is to model the base year used as the starting point [2010] and the last year in the plan [2040], there does not appear to be documentation in the *Plan*, or DEIR, at least what has been made available to the public for their review, nor were we able to find such data in the substantial number of spreadsheets that MTC provided under a Public Records Act request – if we have overlooked such documentation, we invite ABAG and/or MTC to indicate where they can be found.):

1. I assumed that population, as well as total transit expenditures, passengers, and vehicle revenue miles would all increase at constant annual rates between the 2010 and 2040 data in the *Plan*, or from 2010 or 2011 actual data, as available.
2. I assumed a 2% annual rate of inflation, each year, during the *Plan* period, which is slightly under the actual average annual rate of inflation for the period 2001-2011[23], and which, based on my analysis of the various inflation factors for various types of revenues in the *Plan Financial Assumptions* that are more-or-less dependent upon inflation, appears to be close to what MTC is actually using. (and I request here that MTC disclose what inflation factors it is utilizing in the *Plan* model runs for transit operating expenses and capital expenditures.)

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[22] There is nothing in the DEIR that quantifies inflation; only a few notes that it must be accounted for.

The *Draft Bay Area Plan*, Financial Assumptions, March 2013, does have a number of growth assumptions for various revenue sources, but many of these are not quantified – and, strictly speaking, these are assumptions for growth in *nominal* (current year) dollars, and there is no separation of, or even discussion of, inflation as opposed to "real" growth. The closed that we have to an overall inflation assumption appears to be the one given for the very last item, "Anticipated/Unspecified," where there is a 2.2% "growth rate" specified – but, again, this appears to be assumption of nominal growth, with no adjustment for, even discussion of, inflation's impact.

There is not even a mention of nominal growth, or inflation's impacts, on operating expenses and capital expenditures, leaving the reader with missing or unclear inflation assumptions for cash inflow and nothing at all for cash outflows.

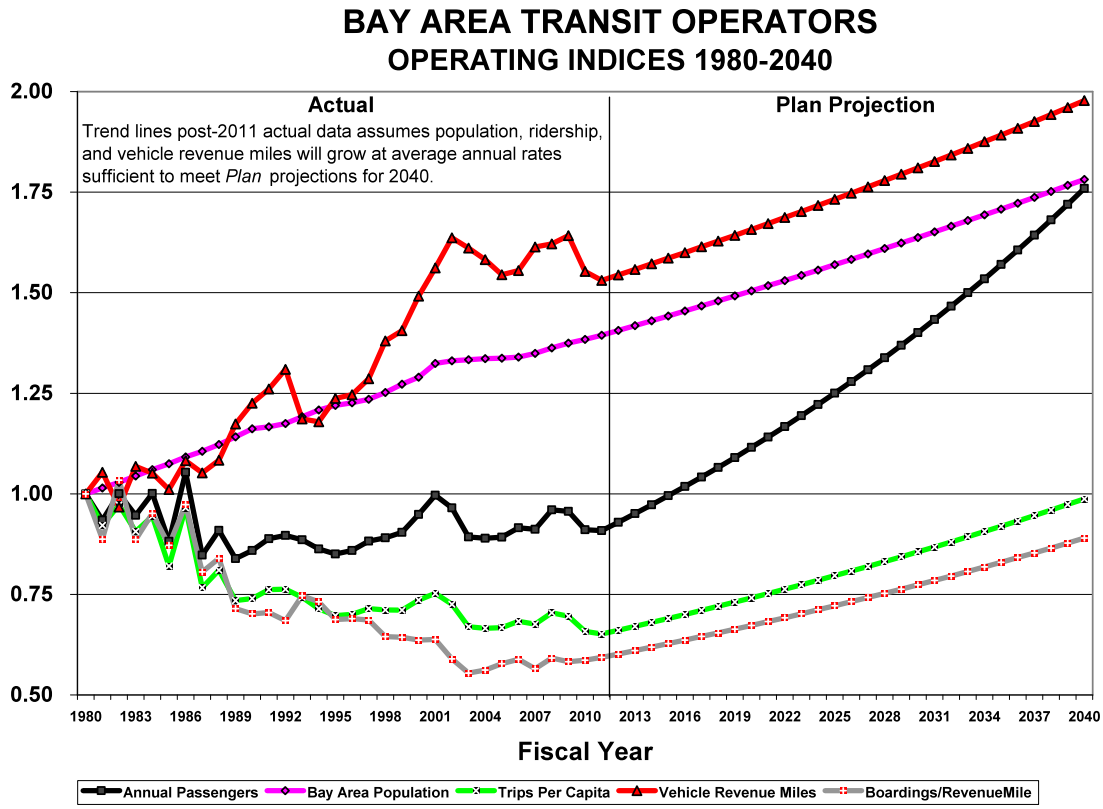
In "Plan Bay Area: Key Action/Decision," there is item, "Inflation Rate – For Plan Bay Area, staff consulted the federal Office of Management and Budget, which projects a long-term inflation rate of 1.8 percent. Staff believes this to be on the low side for the Bay Area. A 10-year historical average of the Bay Area's Consumer Price Index (CPI) yields an annual growth rate of 2.6 percent. As of February 2011, staff is recommending using a 2.2 percent inflation rate – which is the average of the Bay Area's historical average and the OMB's long---term rate." However, this is recommendation and we have no knowledge what assumptions were used – and this document is evidently from approximately early calendar year 2011, over two years prior to the *Plan* and DEIR being released.

[23] See previous footnote, where "A 10-year historical average of the Bay Area's Consumer Price Index (CPI) yields an annual growth rate of 2.6%.

I have not been able to reproduce the 2.6% value and would like to see the details of the calculation and data source.

These assumptions undoubtedly will not reproduce the calculations that MTC has done to prepare and present the *Plan*, but, because the end points or totals for the period are fixed, they cannot be very far off, in total. For example, if population is expected to grow slower in the early years, then it must grow faster in the later years. There will undoubtedly be variations from the constant growth rates shown in the graphs from year to year but, again, in the end, they must even out. Since it is impossible to predict the future with any reasonable degree of accuracy almost thirty years out, let alone each year along the way, this methodology, while admittedly not precise, is definitely sufficiently accurate to be useful in understanding what ABAG and MTC are presenting.

Starting with operating statistics:



The reader of this chart cannot help but focus on the remarkable difference between what actually happened from 1980 to 2011, and what ABAG and MTC are projecting out to 2040.

Changes During Past and Projected Future Periods		
	1980-2010	**2010-2040**
Population	+41%	+28%
Vehicle Revenue Miles	+55%	+27%
Transit Riders	-9%	+94%
Boardings/Vehicle Revenue Mile	-41%	+50%

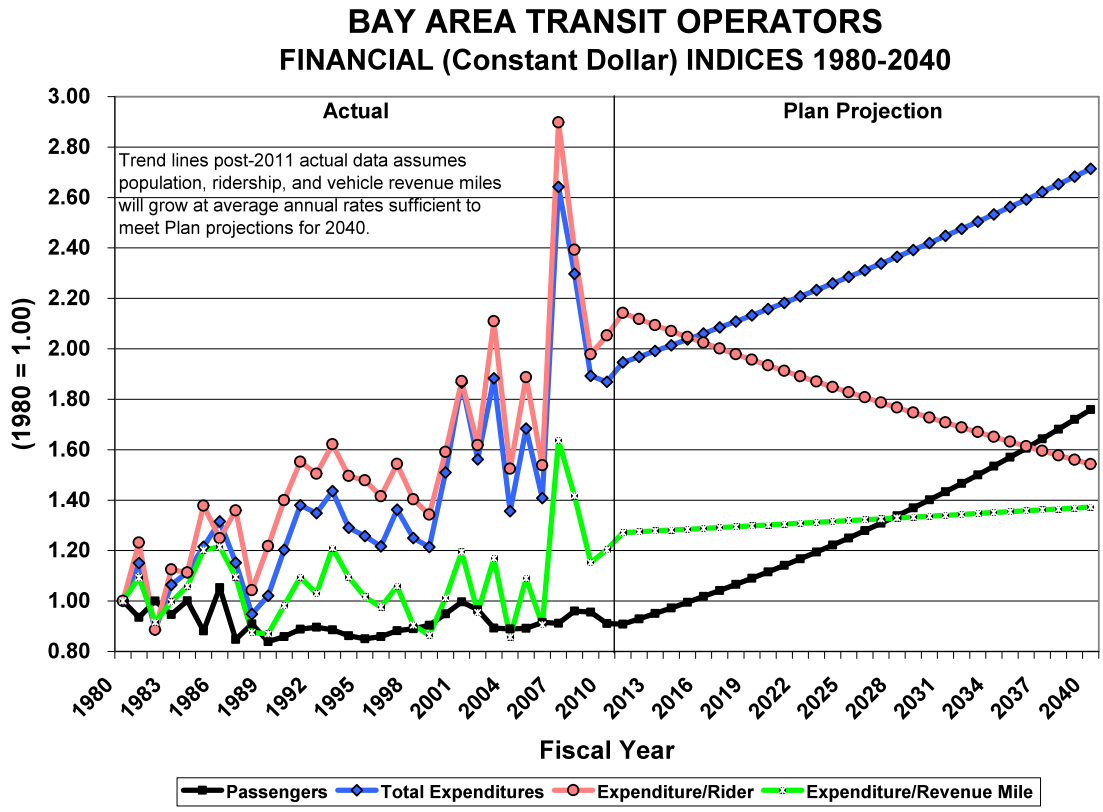
Population is shown growing to 9,196,000 over this period, an increase of slightly over two million. While this is not inconsistent with the historical record, I believe it is overstated and is significantly above the projection of the California Department of Finance Demographic Research Unit, which utilizes a far more credible, and time-proven, methodology. (See my comment on ABAG's 2040 population projection, submitted under separate cover.)

The *Plan* and DEIR do not contain information on vehicle revenue miles, but does have information on transit seat-miles. I assumed that the growth in vehicle revenue miles from 2010 to 2040 would be proportional to the growth in seat-miles over this period. The increase projected over the *Plan*/DIER period is approximately half of the increase over the historical period.

Transit boardings, which dropped 9% during the historical period, are projected as increasing by 94% during the *Plan* period.

Finally, boardings per vehicle mile, which dropped 41% during the historical period, are projected to increase by 50%.

All of these statistics are questionable individually; when taken in combination, they are far more so. In particular, *the complete turn arounds from loss to gain for transit ridership and boardings/mile have nothing remotely close to a precedent in any major urban area in the U.S., and thus are not even remotely plausible, nor can any reasoned case be made that they will be achieved*.



Changes During Past and Projected Future Periods		
	1980-2010	**2010-2040**
Expenditures	+87%	+39%
Transit Riders	-9%	+94%
Expenditures/Revenue Mile	+87%	+8%
Expenditures/Boarding	+105%	-28%

No rational review of the above statistics will provide an explanation of how this combination of events could occur. The actual results from 1980-2010 show (constant dollar) expenditures increasing 87% while ridership fell 9%. In stunning contrast from these past results – which, after all, are the only objective data we have to judge the credibility of the *Plan's* projections – the authors of the *Plan* and DEIR asks us to believe that from 2010 to 2040, when expenditures are projected to increase 39%, ridership will increase 94%. This is not only illogical but it is untethered to reality – particularly when one considers that, assuming rational decision-making by Bay Area transit governing board members and professionals, it must be assumed that the service that was operating in 1980 was, for the most part, the most productive and cost-effective service that could be operated and, further, that the service that was added over the next thirty years – when vehicle revenue miles increased 55% -- was, again for the most part, the best new service that could be operated. But, even with these major service additions, total transit ridership decreased. Yet, somehow, by adding a bit less than half of the service (measured as a percentage) added in the earlier period, the *Plan* projects ridership increasing three-and-one-half times as fast as does the added service.

Yes, the *Plan* projects much larger increases in the modes that have larger vehicles, such as ferry and rail modes, which could be expected to explain part of this increase – if one assumes that the service will attract substantial new ridership. However, this obviously has not occurred with the added service over the past thirty years, a significant portion of which was also added in high-volume vehicles. Thus, while the logic of adding more passengers by operating more service with larger vehicles is sounds logical at first exposure, a review of what is proposed for 2010-2040 compared to what occurred during 1980-2010 paints a very different picture:

- No commuter rail service was reported to the National Transit Database (NTD)[24], our main source of historical transit operating and financial statistics in 1980 (at the time, what is now CalTrain commuter rail service was operated by the then-Southern Pacific Railroad, which, as a private, for-profit railroad, did not report under the NTD; Altamont Commuter Express was not yet even a gleam in its founders' eyes; and Capital Corridor, which operates passenger rail service from Auburn to San Jose, is classified by the Federal Railroad Administration as inter-city rail and ***not*** transit rail and, therefore, does not report to NTD)[25]. Therefore, from 1980 to 2010, there was a 100% increase in

[24] If the then-SP commuter rail service had been reported to NYD, then the ridership decline from 1980 to 2011 would be higher than the 9% I present above. If the ridership on what we now know as CalTrain was, in 1980, the same as it was in 1983, the first year with NTD data, approximately 4.9 million, the reduction in service would be 10%.

However, I am not going to make any adjustments to the NTD data as reported.

[25] NTD 1985 – same citation for other modes in this section of "bullet" points.

commuter rail miles, which is significantly larger than the 58% increase for commuter rail in the DEIR[26].

- BART, the only heavy rail operator in the Bay Area, increased its vehicle revenue miles 117% from 1980 to 2010, significantly larger than the 29% projected for 2010-2040.
- There are two light rail operators in the Bay Area, one of which, Santa Clara Valley Transit Authority, did not operate light rail in 1980 and the other, San Francisco MUNI, added significant service from 1980 to 2010, for a total modal increase for light rail of 160% – again, far larger than the 33% increase presented for 2010-2040.
- Two of the three Bay Area ferry service systems – those of the cities of Alameda and Vallejo – did not exist in 1980. Unfortunately, data for 1980 was not reported for the third, Golden Gate, but based on reported vehicle miles in the immediately following years, it appears that the increase in ferry vehicle revenue miles is well over 200% – far larger than the 54% increase presented for 2010-2040.
- In any case, the mass transit modes with larger vehicles were such a large percentage of the service in 2010 that there just wasn't much room for them to grow; motor bus was 37.1% of seat miles in 2010, decreasing to 32.4% in 2040, leaving only 4.7% of total seat miles for rail and ferry to grow through 2040[27].

Let us do one more analysis of the increase in transit usage projected in the *Plan.* As a general rule, it is far more difficult to increase transit usage significantly in an urbanized area (UZA) that already has high transit usage than one that does not – as the following analysis will show.

Using data from the Texas Transportation Institute's *Urban Mobility Report 2012*[28] (*UMR*), I first calculated the average annual change in transit ridership *per capita* for the 48 urbanized areas that had a population of 1,000,000 or over during 2011. Then, I calculated the transit unlinked passenger trips *per capita* for each UZA for 1985 and 2011, calculated the percentage change over that period, and the average annual compound rate of change for each UZA over the 26-year period. Finally, I graphed the 1985 transit trips/capita and the average annual rate of change, as shown below:

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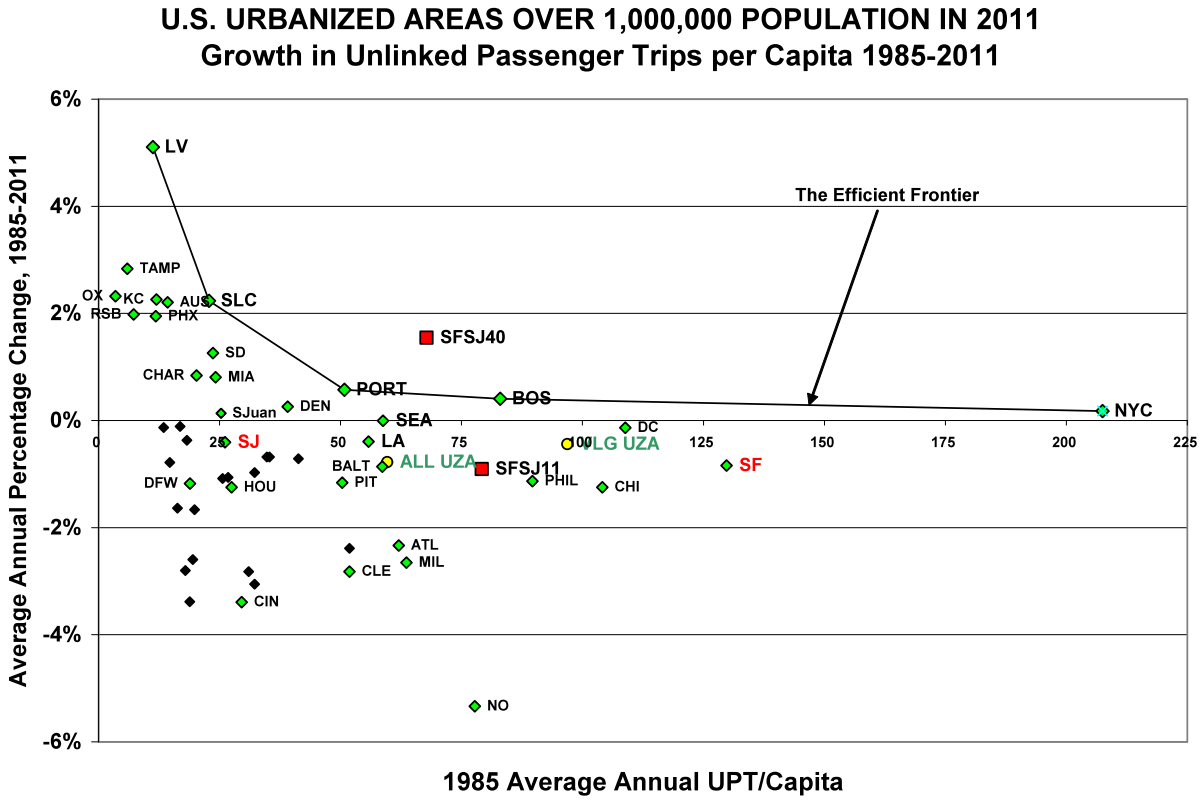
[26] DEIR, Table 2.1-11: Transportation System Capacity (2010-2040), page 2.1-27 – same citation for other modes in this section of "bullet" points.

The 1980-2010 increase percentages are for vehicle passenger miles; the 2010-2040 increase percentages are for seat-miles. There is little reason to believe that there will be major changes in seating/vehicle, particularly increases from 2010 to 2040.

[27] DEIR, Table 2.1-11.

[28] Excel™ spreadsheet, accessed May 1, 2013: http://mobility.tamu.edu/ums/



As can be easily seen from the graph, the higher the initial average annual UPT/capita, the lower the rate of change over the next 26 years (the outlier at the bottom, New Orleans, suffered greatly due to the impacts of Hurricane Katrina in 2005 and the recovery, in many ways, including transit, was far from complete in 2011).

Fifteen of the 48 – 31% – did show increases in transit usage per capita over this period, but most of these began the period with low transit usage. The average annual rate of change for the fifteen very large (>2,000,000 population in 2011) UZAs was an average annual rate of loss of .443% and, for the 33 large (1,000,000-2,000,000 population in 2011) UZAs, -.972%.

Five (Boston, Miami, New York City, Phoenix, and San Diego) of the fifteen very large UZAs (the others are Atlanta, Chicago, Dallas-Forth Worth, Detroit, Houston, Los Angeles, Philadelphia, San Francisco-Oakland, Seattle, and Washington, DC) had increases over this period. I have graphed the "efficient frontier" – the line between the entities with positive growth rates that scribes the line which no UZA exceeds.

I then plotted the *Plan's* projected change from 2010 to 2040 for the nine county Bay Area (which includes the "very large" San Francisco-Oakland and the "large" San Jose UZAs, along with several smaller ones). As can be seen, the *Plan's* projected average annual growth rate (over the thirty year period) of 1.544% is significantly higher than New York City's .146%, Boston's .408%, and Portland's .573%. To find a UZA with a higher average annual growth rate than the *Plan's* projections, one has to keep moving left on the graph to Salt Lake City – which

started in 1985 with 22.8 transit trips/capita, approximately one-third of the 67.8 that the combined SFSJ area had in 2010.

This statistic, by itself, certainly does not mean that the outcome projected in the *Plan* is impossible. It does, however, show that no other large or very large U.S. UZA has accomplished anything remotely similar to what the *Plan* projects, and establishes that the likelihood of the *Plan* results being accomplished must be considered exceedingly unlikely, particularly when considered in combination with all that I have presented previously in this paper.

Bay Area Public Transit Statistics – 1980-2011
Sources and Notes

All years are fiscal years, running July 1 to the June 30 of the subsequent year, and are expressed in terms of the ending year (fiscal year 1982-83 is referred to as 1983).

Operating Expenses and Non-Financial Operating Data

The source for operating expenses and non-financial operating data is the U.S. Department of Transportation, Federal Transit Administration, National Transit Database (NTD).

Although the first NTD reporting year was 1979, the data for this year was deemed unusable because several major transit operators did not report important statistics; the Alameda-Contra Costa Transit District (AC Transit) did not report employees, the San Francisco Municipal Railway (MUNI) did not report operating costs or unlinked passenger trips, and the San Francisco Bart Area Rapid Transit District (BART) did not report revenue vehicle miles or hours.

The number of reporting agencies grew significantly over time. The first few years had only six of the seven major Bay Area transit operators (besides the three mentioned above, the other three that reported from the first year were the Golden Gate Bridge, Highway and Transportation District [Golden Gate], the San Mateo County Transit District [SamTrans], and what is now known as the Santa Clara Valley Transportation Authority [VTA]), plus the Santa Rosa City Bus and Vallejo Transit. The seventh "major," what we now know as the Peninsula Corridor Joint Powers Board, dba Caltrain, was in service at that time, but was privately operated by what was then the Southern Pacific Railroad. The first data from that system was reported to NTD for 1983, after the service began to be subsidized by the State of California prior to the transition to the current joint powers agreement ownership and operation.

Over this period, many transit agencies were either created anew or spun off from other agencies. Altamont Commuter Express (ACE) first reported service in 2002 and Alameda Ferry Service first reported in 2004. Service to areas formerly served by AC Transit that was taken over by other operators includes the Central Contra Costa Transit Authority (County Connection), which first reported in 1983, the Eastern Contra Costa Transit Authority (TriDelta), the Livermore-Amador Valley Transit Authority (LAVTA or Wheels), Union City Transit, and the Western Contra Costa Transit Authority (WestCAT).

Note that the above is not a complete list of all transit authorities included in the 2011 data, which totals 24. We suspect that some transit agencies existed, but did not report data, for some years before their first data inclusion in NTD. Also, for many of the smaller agencies, and occasionally for larger agencies, there is missing data for one or more categories in many of the early years. These data, if reported, would be minor, so we have elected to ignore the missing data, particularly as, if it was reported, it would show even larger declines in ridership and larger increases in costs than is shown in the graphics and tables I present above.

Data for 1980 through 1988 was obtained from the National Transit Database annual "hard copy" reports, summing the data for the individual transit operators from the various data tables. Beginning in 1989, the source was the *Statistical Summary of Bay Area Transit Operators*, which is published, currently annually, by the Metropolitan Transportation Commission, with each report containing five years of data, as follows:

Statistical Summary Report	Reporting Years
1988-89 through 1992-93	1989
1989-90 through 1993-94	1990-1994
1994-95 through 1998-99	1995-1996
1996-97 through 2000-01	1997-2001
2001-02 through 2008-06	2001-2006
2006-07 through 2010-11	2007-2011

From the above, the source was a table in the first part of each document, "Bay Area System – Statistical Summary."

http://www.mtc.ca.gov/library/pub.php

Capital Expenditures

While operating expense data on an actual, as-spent basis was relatively easily obtainable from NTD, obtaining actual capital expenditures was far more difficult, so we opted instead to use programmed expenditures. There are generally differences between capital budgets and capital expenditures, both in dollar value and in timing, but we believe that any inaccuracies incorporated due to this difference are relatively inconsequential for our instant purpose.

Capital expenditures were obtained from the *Transportation Improvement Programs* (TIP) published by MTC, first annually at the beginning of the study period, later bi-annually. The data in these reports varied significantly in detail and method of presentation, which led to the use of various methodologies, as detailed below, for the data. In general, while the TIPs cover various periods, generally four years, we used the first year, or years, in every case, to the extent possible, working on the general expectation that spending programmed for later years might later be adjusted. The date shown (in parenthesis) is the date of the TIP, as shown on the respective TIP cover:

- 1980 – (1979-1980): Regional Program Summary – Transit and Highway, page 3-3.
- 1981, 1982, 1983 – (1980-1981) – 1980 Transportation Improvement Program, page II (the TIPs for the following two years did not present transit capital data in an easily usable format).
- 1984 – (1984-88) – FY 1984-88 Regional Transit Capital Priorities – Summary: All Projects (no page number).
- 1985 – (1985-89) – FY 1985-89 Regional Transit Capital Priorities – Summary: All Projects, page II-13.

- 1986 – (1986-90) – FY 1986-90 Regional Transit Capital Priorities – Summary: All Projects, page II-13.
- 1987 – (1987-91) – FY 1986-90 (*sic*: the title is wrong and the data presented in the table is for 1987-1991) Regional Transit Capital Priorities – Summary: All Projects, page IV-8.
- 1988, 1989 – (1988-92) – FY 1988-92 Regional Transit Capital Priorities – Summary: All Projects, page IV-7 (the TIPs for the following year did not present transit capital data in an easily usable format).
- 1990 – (1990-94) – FY 1990-94 TIP Transit Element, page 1-4-2.
- 1991 – (1991-95) – Table 5-1: All Regional Capital Projects, page 1-5-2.
- 1992 – (1992-96) – Table 5-1: Regional Capital Projects Requiring Federal Actions, page 1-5-2.
- 1993 – (1993) – Table 5-1: Regional Capital Projects Requiring Federal Actions, page 1-5-2.
- 1994 – (1994) – Table 5-1: Regional Capital Projects Requiring Federal Actions, page 1-5-2.
- 1995, 1996, 1997, 1998, 1999 – (1995) – Table 4-1: Regional Capital Projects Requiring Federal Actions, page 1-5-2/3 (the TIPs for the following two years did not present transit capital data in an easily usable format).
- 2000 – We could not locate a table with easily usable data, so we entered an amount equal to the simple average of the two preceding and two following years.
- 2001, 2002 – (2001) – Figure 2: Programmed TIP Funds by Mode and Purpose, page 12. Beginning in 2001, expenditures were broken into six major categories, Bike/Pedestrian, Highway, Local Roads, Mass Transit, Other, and System Management. The latter two were allocated to transit according to the ratio of transit capital expenditures to total non-other/system management expenditures; for example, if transit capital expenditures were 45%, other and system management 10%, and all other 45%, then half (45%/90%) of the other and system management 10%, or 5%, was added to transit.
- 2003, 2004 – (2003) – Figure 2: Programmed TIP Funds by Mode and Purpose, page 10.
- 2005, 2006 – (2005) – Figure 2: Programmed TIP Funds by Mode and Purpose, page 20.
- 2007, 2008 – (2007) – Figure 3: Programmed TIP Funds by Mode and Purpose, page 32.
- 2009, 2010 – (2009) – Figure 3: Programmed TIP Funds by Mode and Purpose, page 32. Because this TIP does not present programmed annual expenditures, the four-year total transit capital expenditures were divided by four to produce annual amounts for the first two years of this four-year period. This is obviously not precise, but we believe it is reasonable and, if anything, is probably on the low side, as the fast majority of the prior TIPs reviewed had larger expenditures programmed for the first years than the last.
- 2011 – (2011) – Figure 3: Programmed TIP Funds by Mode and Purpose, page 32.

Population

All historical population data is from California Department of Finance, Demographic Research Unit, reports as listed below, accessed April 26, 2013:

http://www.dof.ca.gov/research/demographic/reports/view.php#objCollapsiblePanelEstimatesAnchor

- 1980: E-6 County Population Estimates and Components of Change—July 1, 1970–1990
- 1981-1990: E-4 Historical Population Estimates for Cities, Counties and the State, 1981-1990,
- 1991-2000: E-4 *Historical Population Estimates for Cities, Counties and the State, 1991-2000, with 1990 and 2000 Census Counts*, August 2007
- 2000-2010: E-2 *California County Population Estimates and Components of Change by Year, July 1, 2000-2010.* Sacramento, California, December 2011.
- 2010-2012: E-2 *California County Population Estimates and Components of Change by Year – July 1, 2010-2012*, December 2012

The process was to sum the individual estimates for each of the nine counties for each year, as of January 1 of each year, the mid-point of each fiscal year.

Unfortunately, the DRU estimates are for various days of the year. These were adjusted as follows:

- 1980 – Simple average of the July 1, 1979 and July 1, 1980 data.
- 1981-2000 – No modification required, data presented is for January 1.
- 2001-2011 – Simple average of the July 1 data for six months prior and six months following each July 1

Average Annual Rate of Change in Unlinked Passenger Trips Per Capita

Source for this is Texas Transportation Institute, 2013 *Urban Mobility Report*, Excel™ spreadsheet – 101 Urban Areas, accessed April 27, 2013:

http://mobility.tamu.edu/ums/

***Plan*/DEIR Population and UPT**

Population and unlinked passenger trip data for the Bay Area from DEIR, Table 2.1-10: Bay Area Demographic Forecasts (2010-2040), page 2.1-25 and Table 2.1-12, Bay Area Travel Behavior, 2010-2040, page 2.1-28.

Inflation

The inflation index used was, U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index-All urban Consumers, San Francisco-Oakland-San Jose, 1982-1984 = 100, accessed April 26, 2013 (use "Regional Resources" map and pull-down tool at right side of page below "Latest Numbers"):

http://www.bls.gov/cpi/

Although the data above is all on a fiscal year basis, we have utilized the calendar year CPI data, primarily because the data required to calculate fiscal year CPI-U was not available prior to 1984; any distortion caused by this should be very minor.

For years after 2011, the assumed inflation is 2% annually, which is slightly less than the actual average annual rate of inflation from the above for 2001-2011.

Plan Bay Area **Transit Expenditures and Operating Statistics**

Plan, Table 2, "Plan Bay Area Transit Improvement Strategy ($ in Billions)," page 68. Although this table does not explicitly state that the values are expressed in year-of-expenditure dollars, Figure 6, "Transit Operating Funding by Operator 2013-2040, YOE$," does specifically identify its dollar values as "YOE$" – year of expenditure dollars – and the sum of the amounts indentified in the bars on Figure 6 appears to match the dollar value for Transit Operations in Table 2, thus strongly indicating that Table 2 figures are expressed in year of expenditure dollars.

DEIR, Table 2.1-11: Transportation System Capacity (2010-2040), page 2.1-27, has transit seat-mile data for 2010 and 2040. I assumed that the increase from 2010 to 2040 for seat miles would be proportional to the increase in vehicle revenue miles over the same period and multiplied that increase factor by the actual vehicle revenue miles from MTC *Statistical Summary* for 2010.

DEIR, Table 2.1-12: Bay Area Travel Behavior, 2010-2040, page 2.1-28, has daily transit boardings for 2010 and 2040. I assumed that the increase from 2010 to 2040 for daily boardings would be proportional to the increase in total annual boardings over the same period and multiplied that increase factor by the actual annual boardings from MTC *Statistical Summary* for 2010.

PORTLAND –
A CASE STUDY WITH LESSONS FOR THE BAY AREA

Summary

One of the best tests for a long-range plan is to compare the outcomes predicted in that plan to the actual results for similar cases that have already occurred. The transportation outcomes of the *Plan* are, to a very large extent, based on the implementation of a "smart growth" approach to urban land use and the intention to create a coordinated major growth in transit utilization.

There is little doubt that, in the U.S., the urbanized area (UZA) that has utilized the smart growth approach to land use and transportation planning the longest and the most intensively is the Portland, Oregon-Washington UZA. Therefore, the comparison of the results that are projected in the *Plan* and DEIR to what has actually occurred in Portland is very appropriate.

This section will:

- Review the smart growth and transportation planning and execution in Portland
- Compare the powers of the governmental entities in the State of Oregon and the Portland UZA to require and implement smart growth by fiat to those of their counterparts in California and the Bay Area
- Compare the transportation outcomes, in terms of change in non-transit road and transit utilization, that have actually been achieved in Portland to those projected in the *Plan*

In short, what this comparison reveals is that the governmental agencies in Portland have far more powers over land use than their counterparts in the Bay Area, that they have used these powers very powerfully and consistently for four decades, and have achieved major increases in transit utilization, and this increase in transit utilization was accompanied by very deliberate actions to shift funding from roads to transit and to purposefully not only to not increase, but to actively decrease, road capacity. The outcome was that no larger UZA has achieved greater growth in transit utilization than Portland (indeed, twenty of the twenty-two larger UZA's at the end of the study period had incurred losses in transit utilization). The average annual rate of growth in transit ridership for Portland during the twenty-one year period studied is 56% higher than that projected in the *Plan* from 2010 to 2040.

Yet, despite the great powers that the governmental units of Portland imposed to increase transit and decrease road use, the actual average increase in road use in Portland was three-and-one-half times that projected in the *Plan*.

I believe that this is not logical and, since the Portland results are a matter of historical record, the obvious difficulty in the comparison is that results projected for the Bay Area appear to be very inconsistent with what can be reasonably expected, given the Portland historical experience, as well as other historical, factual data, and logical analysis of the *Plan* and the planning process for it.

Background

I am now completing a paper for Reason Foundation examining the connection between changes in transit utilization in metropolitan areas and changes in traffic congestion, currently scheduled for publication this summer. The paper includes seven case studies, including one of Portland, of major urbanized areas (UZA) with factors that should be of interest nationally. In many ways, the Portland case should be of most interest to transportation practitioners – and, in particular, to those that are preparing and studying the *Plan* and DEIR.

After the analysis that I have prepared anew for this comment letter is an excerpt of the paper which, among other things, discusses Portland's approach to urban planning and land use.

The general conclusions are:

- It is undoubtedly fair to say that it is difficult to discuss smart growth in America without spending a great deal of time discussing Portland.
- As documented below, the State of Oregon and the Portland area in particular have had, for four decades, the strongest smart growth land use legislation and plans in the nation, including:

    - A State-mandated requirement for what we now know as smart growth, with many specifics, and enforcement powers that most MPO cannot even dream of.
    - An urban growth boundary surrounding greater Portland which effectively prohibits virtually all development in the "green belt."
    - The only popularly elected metropolitan planning organization board in the nation – Portland Metro – which has, compared to virtually every other major U.S. urbanized area, extraordinary powers to direct, and to prohibit, development and to implement, or require other governments to implement, land use and transportation policies.
    - A transit-first policy that has not only directed a major share of ground transportation funds to transit, far in excess of the portion of trips or passenger miles taken on transit, for decades, but has also specifically worked to prohibit road expansion and, in many cases, to reduce road capacity.

In summary, government agencies in the greater Portland area have had far more power to direct land use than their counterparts in the Bay Area, have had them for decades, and have used them extensively.

Portland vs. Bay Area Transportation Quantitative Comparison

I bring this up specifically to be able to draw comparisons with the projected transportation outcomes of the DEIR, specifically the following, from page 2.1-28:

"**TABLE 2.1-12: BAY AREA TRAVEL BEHAVIOR, 2010-2040**

	2010	*2040 Plan*	*Change (2010 to 2040 Plan)*	
			Numerical	*Percent*
Daily[1] Transit Boardings	1,581,000	3,054,000	1,473,000	+93%
Daily Vehicle Trips[2]	16,912,000	20,677,000	3,765,000	+22%
Daily Vehicle Miles of Travel (VMT)[2]	149,046,000	179,408,000	30,362,000	+20%

Notes:
1. Daily metrics are measured for a typical weekday.
2. Only reflects interzonal trips (assigned directly to the highway network); excludes intraregional, interregional, airport-bound, and commercial vehicle trips."

For the analysis I present below, I need "plain old ordinary" daily vehicle miles of travel, rather than the unique definition that MTC uses above, but, for my current purpose, I'm going to assume – after analyzing the data – that it doesn't make much difference[29].

I am going to draw comparisons between the data above and comparable data from Portland. Because the time periods are different – 30 years for the *Plan* vs. 21 years for the Portland data – I need to convert all growth rates into average annual compound growth rates, as follows:

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[29] The definition of "Daily Vehicle Miles of Travel," as described in Note 2, is somewhat unusual, in that the travel that is measured is, evidently, only trips within the various regions within the Bay Area and from one region within the Bay Area to another region within the Bay Area. It specifically excludes road trips from outside the Bay Area to inside the Bay Area, from inside the Bay Area to outside the Bay Area, trips that are passing through the Bay Area, and all commercial vehicle trips (presumably, primarily trucks), trips to (and, presumably, from) airports.

However, for my present purpose, this appears to be pretty much a distinction without a major difference. Referring to DIER Table 3.1-8: Bay Area Travel Behavior, 2010-2040, page 3.1-24, we find all three metrics above for both the "*2010*" and "*2040 Plan*" periods – and we also find that "Interregional Daily Vehicle Trips" – which is the "trip" counterpart of the "Daily Vehicle Miles of Travel" in Table 2.1-12 – are 87.7% of the Total Daily Vehicle Trips for *2010*, 85.0% for *2040 Plan*, 86.3% for *2040 No Project*, 86.3% for *2040 Transit Priority Focus*, 87.0% for *2040 Enhanced Network of Communities*, and 86.2% for *2040 Environment, Equity, and Jobs*.

So, with MTC's specially defined type of VMT being such a large portion of total VMT, and also being a rather consistent portion of the total (85.0%-87.7%), and because the results that I will be showing don't require an extremely high degree of accuracy to draw meaningful conclusions, and because the MTA model certainly does not have precision down to the thousands value as MTC includes in its schedules, this "close enough" assumption is valid and useful for the analysis that follows.

BAY AREA AND PORTLAND AREAS TRANSPORTATION GROWTH RATES				
	Years			
	Start	End	Growth	Average Annual Growth Rate
Bay Area[30]	**2010**	**2040**		
Daily Transit Boardings	1,581,000	3,054,000	93.2%	2.22%
Daily VMT	149,046,000	179,408,000	20.3%	.62%
Portland	**1989**	**2010**		
Transit Boardings[31]	54,225,054	110,892,392	104.5%	3.47%
Transit Passenger Miles	211,056,160	487,080,461	130.8%	4.06%
Daily VMT[32]	22,113,000	34,902,000	57.8%	2.18%

Now let us draw some comparisons between the Bay Area over the period of the *Plan*, 2010-2040, and Portland over the historical period, 1989-2010:

- By national standards, the Bay Area has one of the strongest and most powerful MPO's in the U.S., MTC, but Portland Metro has far more powers – and has used them extensively.
- The Bay Area has nine counties, three major cities (Oakland, San Francisco, and San Jose) of approximately equal size, plus 98 smaller cities, towns, and numerous unincorporated communities, with vastly varying political and land use policies and practices. While most of these Bay Area local governments, particularly the larger ones, support many aspects of smart growth, the Portland Metro area, which consists of 25 cities and numerous unincorporated communities within the metropolitan areas of three counties, with a major portion of the population centered in the dominant largest city of Portland, has a far stronger overall orientation and commitment to smart growth and has done far more to implement such policies and practices in the Portland UZA than is anticipated in the *Plan* for the Bay Area.

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30 Bay Area data from DEIR, Tale 2.1-12: Bay Area Transit Behavior, 2010-2040, page 2.1-28.

31 Transit Boardings and Passenger Miles for Tri-County Metropolitan Transportation District of Oregon (TriMet), the transit operator for the Oregon side of the UZA, and Clark County Public Transportation Benefit Area Authority (C-TRANS), the operator for the Washington Side, for the years specified, obtained through Federal Transit Administration, National Transit Database, from Integrated National Transit Database Analysis System, Florida Department of Transportation, accessed May 6, 2013:
http://www.ftis.org/INTDAS/NTDLogin.aspx?ReturnUrl=%2fINTDAS%2fB10.aspx%3fPage%3dsystem&Page=system

32 Vehicle miles traveled (VMT) data from Federal Highway Administration, "Highway Statistics Series," accessed May 5, 2013:
http://www.fhwa.dot.gov/policyinformation/statistics.cfm
For years 1992 and after, data is from Table HM-71, "Mileage and Daily Vehicle Miles of Travel" for each year reported. For earlier years, source was Table SS##-20, where "##" is the last two digits of the year.

- The State of California has strong land use statutes tending to support smart growth practices, but the State of Oregon wrote the book on this subject decades ago and has far stronger requirements and practices than California.
- In brief, in the Portland Metro area, there is a far more powerful and more unified approach to smart growth than in the Bay Area and far more smart growth-supportive policies have been implemented, required, and enforced.
- The Portland area has also adopted, implemented, and enforced far more policies and budgets to fund transit and defund roads and road travel.
- Over the period, 1989-2010, the greater Portland area had a 3.47% average annual rate of growth in unlinked passenger trips (UPT); over the period 2010-2040, the *Plan* projects a 2.22% annual rate of growth in transit UPT.

In every single category above, the Portland Metro area has demonstrably far superior conditions to support smart growth outcomes; yet, with all of these advantages, Portland had a 2.18% average annual growth rate in daily VMT, yet the *Plan* and DEIR project that the Bay Area will produce only .62% average annual growth, approximately 28% of what Portland actually achieved.

I submit, given these comparative conditions, having the Bay Area "win" the competition to limit growth in auto usage, particularly by such a large factor, is simply not logical.

Peer analysis is a very important tool in testing the reality of projections such as these. In the U.S., when one looks for a peer to test one's self against in smart growth and related policies and outcomes, there is Portland, and then there is a very large gap until the next city or UZA that comes up. Therefore, when one compares one's results against those of the recognized national champion, which has so many important major advantages in so many areas[33], and then projects results over three-and-one-half times as high, then perhaps the logical conclusion to be derived from this analysis is that one should go back and take a long hard look at everything that went into the *Plan* and how the numbers were crunched to produce the published results, as things just do not compute.

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[33] This is, of course, not to say that the Portland area and the Bay Area have no differences. There are many, including:

1. Portland Metro does not include the rural areas of the three Oregon Counties it serves, while ABAG and MTC comprehend the entire, urban, suburban, and rural areas of the nine Bay Area counties.
2. Portland Metro only covers the Oregon side of greater Portland, not the Washington side, mainly Clark County and the City of Vancouver. Washington State and Clark County certainly do not have smart growth policies as strong as those South of the Columbia River, but is probably not inaccurate to say that their policies are, overall, roughly comparable to those of the State of California. The Oregon side had 81% of the total population and 83% of VMT in 2004 (FHWA, Table HM-71).
3. The San Francisco and San Jose UZA's combined have slightly over three times the population of the Portland UZA – and greater density.

While these and other differences are certainly not factors that I am stating have no impact on this analysis, overall, considering the many similarities as well as the many differences – and the differences do not all work in the same direction to influence results – I conclude strongly that the similarities overwhelm the differences, and that this comparison is valid for its intended purpose.

There is one other factor that should be considered. Portland has been exceedingly successful, by comparison to other large U.S. UZA's, in increasing transit utilization; no larger UZA (Portland ranked 23rd in population in 2007) had higher transit growth rates; indeed, there were only two larger UZAs (New York City – which implemented the fare reduction/existing service improvement strategy for increasing transit utilization discussed above – and Boston) that had any growth in transit utilization at all. But, let us consider the overall importance of non-transit road travel and transit, in terms of passenger miles, over the period 1989-2010, as shown in the graphic below[34]:

[34] Transit passenger-mile and road VMT data from *ibid*.

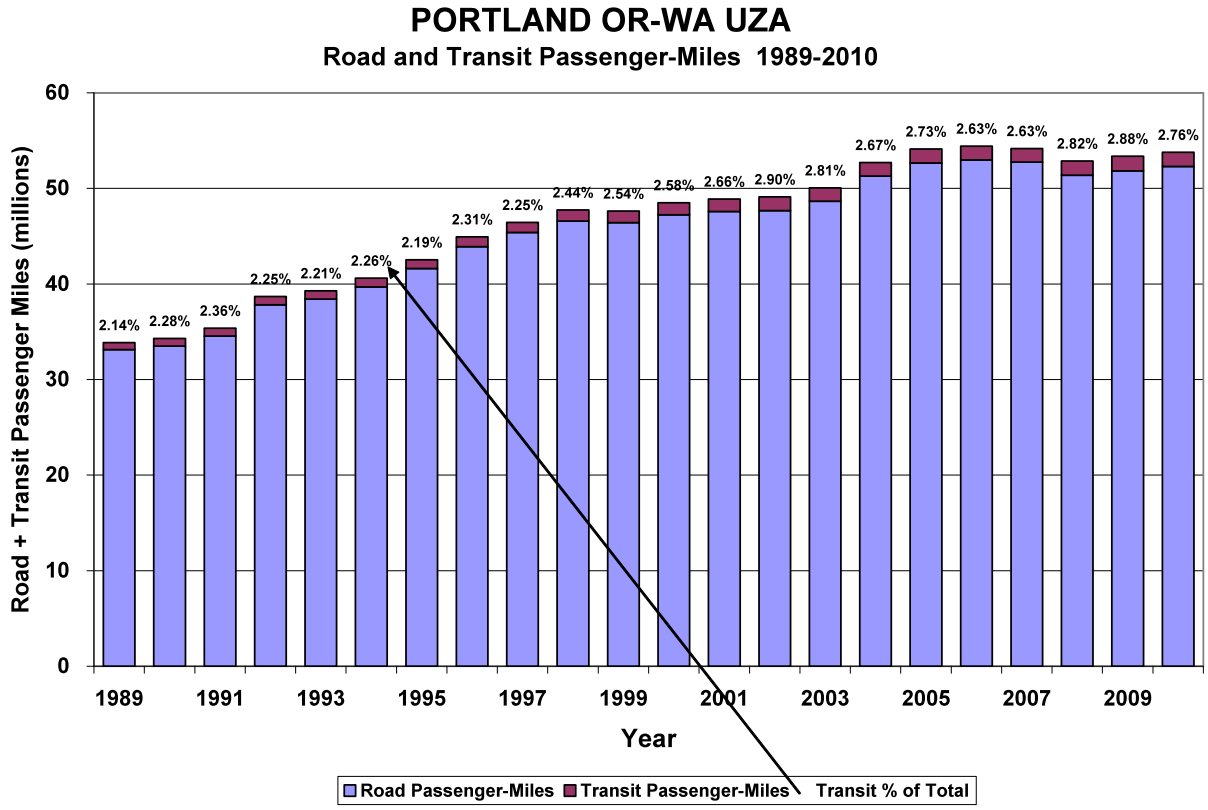
To put transit and road passenger miles on a common basis, two adjustments were necessary, one each for transit and for roads.

Transit daily passenger mile data was calculated using data from NTD for TriMet and C-TRANS for the 2000 reporting year, which is the middle year of the time period studied. Average Weekday Unlinked Trips was multiplied by the average trip length for the year. NTD "profiles" accessed May 7, 2013: http://www.ntdprogram.gov/ntdprogram/data.htm

Daily road passenger mile data was calculated by multiplying the average weekday VMT from FHWA by the average vehicle occupancy of passenger cars, motorcycles, and other 2-axle, 4-tire vehicles, using data on vehicle miles and passenger miles from U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, *Pocket Guide to Transportation 2003*, Tables 10 and 11, "Vehicle Miles" and "Passenger Miles," respectively, accessed May 6, 2013: http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/pocket_guide_to_transportation/2003/index.html

(Calculated average vehicle occupancy for light-duty vehicles was 1.59 for 2000.)

The 2000 factors above were utilized for all years analyzed; any variations from year-to-year are not significant to the overall import of the analysis.



Over the period 1989-2010, while transit passenger-miles grew significantly, the growth of transit passenger-miles for the entire 21 years was equal to just over nine months worth of average growth of road passenger-miles. The entire total transit passenger-miles, including the initial base, were equal to about 19.5 months of growth in road passenger-miles.

Portland[35]

Statistics

Urbanized Area: **PORTLAND**

	1982	2007	2007 Rank[36]	82-07 % Growth
Population	1,130	1,800	23	59.3%
Population/Sq. Mi	3,229	3,333	10	3.2%
TTI	1.07	1.29	T20	314.3%
FW VMT/FW Lane Mile	9,649	17,357	15	79.9%
Arterial VMT/Lane Mile	5,810	5,374	30	-7.5%
Transit UPT/Capita	46	59	8	28.6%
Transit PM/Capita	199	249	12	25.1%
Total Road Miles/Million Population		3,860	45	
Freeway Centerline Miles/Million		84	56	
Freeway Lane Miles/Million		435	63	
Average Freeway Lanes/Mile		5.16	49	

Daily Modal VMT Equivalent Percentage:

Freeway	37.8%
Arterial	38.3%
Other Road	21.5%
Transit	2.4%

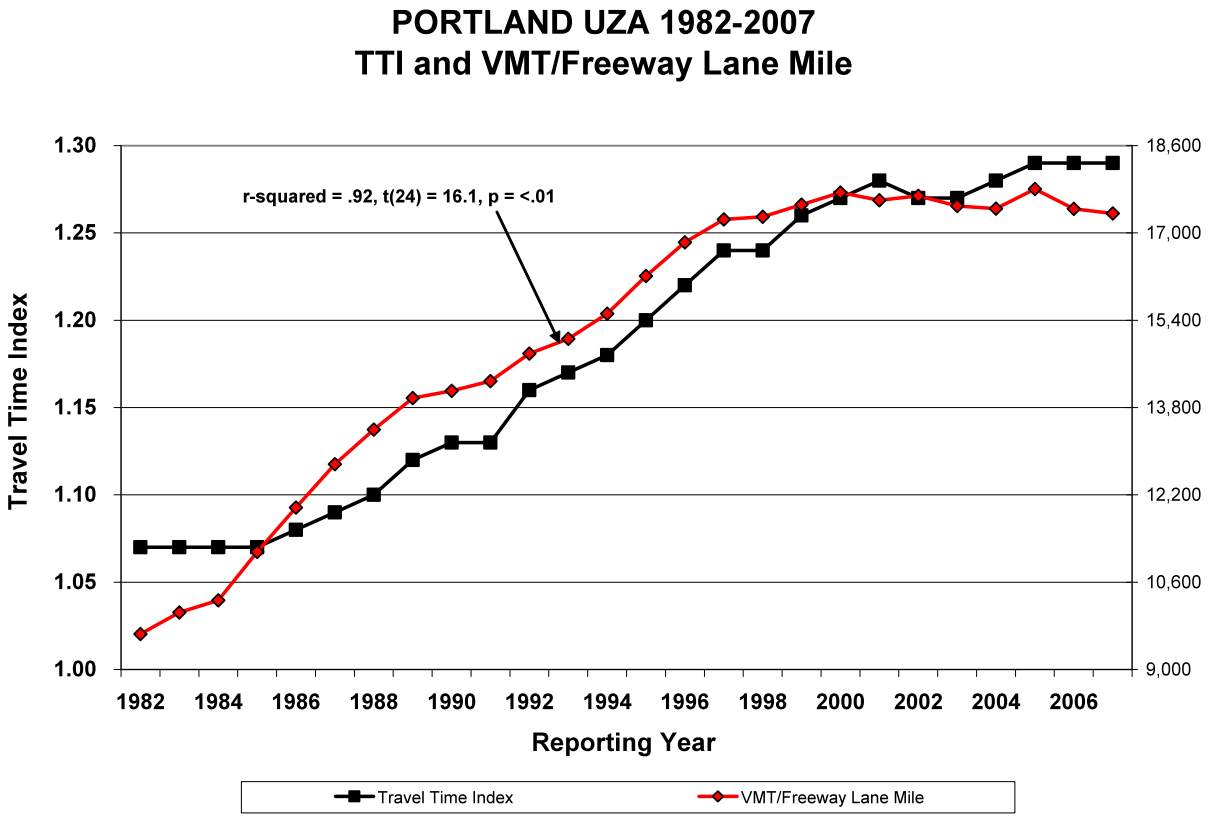
ACS Home-to-Work Commute Time 2006-08:

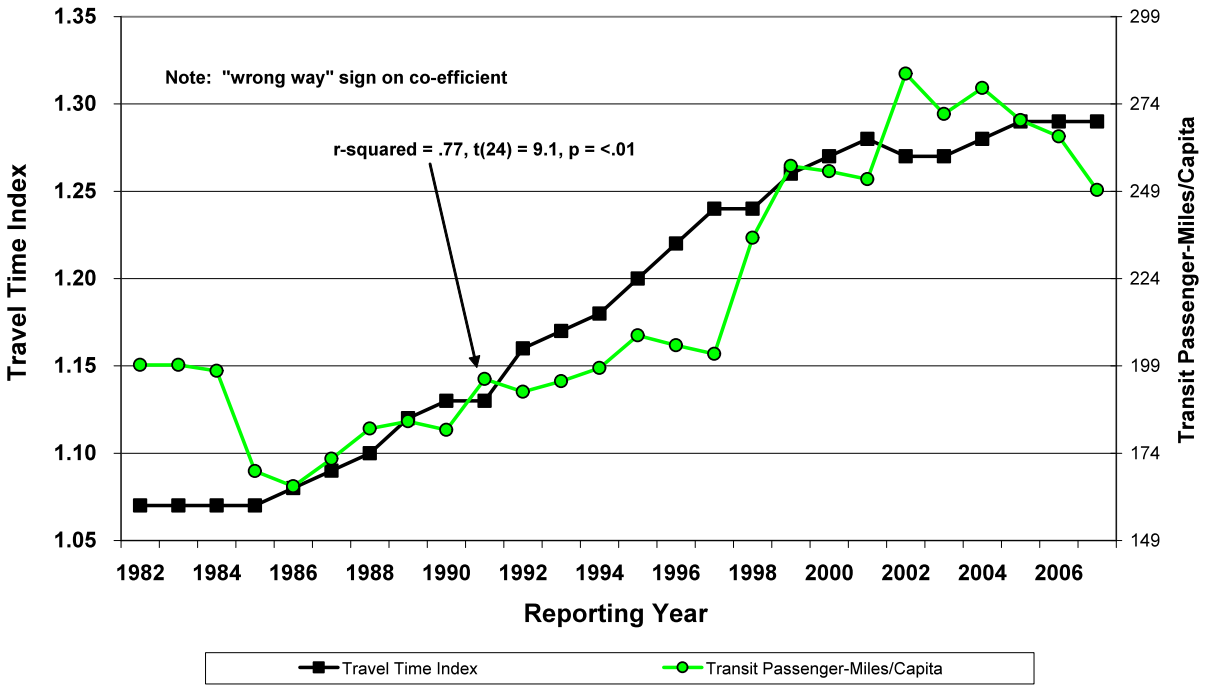
	Minutes			
	Core City	Other	Whole	Rank
Road	21.6	22.7	22.4	
Transit	38.2	46.3	41.9	
Overall	22.2	22.8	22.6	39
	Modal Splits			
Road	72.1%	86.3%	81.8%	
Transit	12.5%	4.9%	7.3%	
Other	15.4%	8.8%	10.9%	
Core City Population:	31.1%			
Core City Workers:	31.8%			

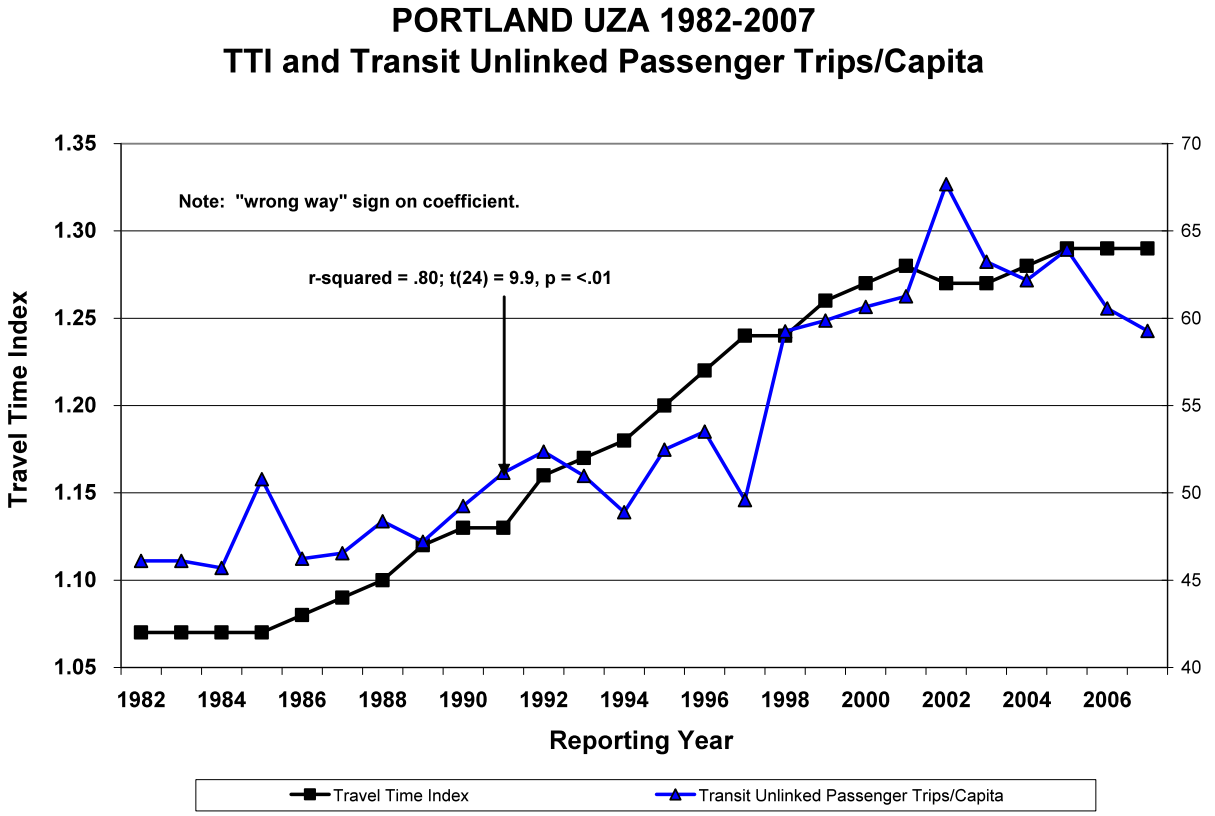
[35] The remaining portion of this section of my comments on the DEIR and *Plan* is an excerpt from a forthcoming paper for Reason Foundation on the impact of changes in transit utilization on change in traffic congestion.

While this Portland case study on traffic congestion has some interesting implications for the Bay Area, my main purpose for including this in my comments was to utilize the documentation of the land use planning and execution, and results, for the Portland UZA.

[36] Ranks are within the 74 U.S. UZA's that had a population of 500,000 or more at the end of the study period:


PORTLAND UZA 1982-2007
TTI and VMT/Freeway Lane Mile
r-squared = .92, t(24) = 16.1, p = <.01
Travel Time Index
Reporting Year
1.30
1.25
1.20
1.15
1.10
1.05
1.00
18,600
17,000
15,400
13,800
12,200
10,600
9,000
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
Travel Time Index
VMT/Freeway Lane Mile


PORTLAND UZA 1982-2007
TTI and Transit Passenger-Miles/Capita
Note: "wrong way" sign on co-efficient
r-squared = .77, t(24) = 9.1, p = <.01
Travel Time Index
Transit Passenger-Miles/Capita
Reporting Year
1.35
1.30
1.25
1.20
1.15
1.10
1.05
299
274
249
224
199
174
149
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
Travel Time Index
Transit Passenger-Miles/Capita



Discussion

The Portland OR-WA UZA includes the City of Portland and all or portions of Clackamas, Marion, Multnomah, Washington; and Yamhill, Oregon and Clark County, Washington[37].

Portland, located on the Willamette River approximately 100 miles inland from the coast, began as a major seaport. As it became the population and economic center of Oregon, Portland added significant road and rail connections.

The most important Interstate Highways are the north-south I-5, from San Diego on the Mexican boarder to Los Angeles and the California Central Valley up to Seattle and Vancouver, British Columbia, and I-84 to Salt Lake City, connecting to I-80 east to Denver, Chicago and New York City.

The Tri-County Metropolitan Transportation District of Oregon (Tri-Met; the three counties referenced in the name are Clackamas, Multnomah and Washington) is the transit operator on the Oregon side of the Columbia[38]. At the end of the study period, it was the 17th largest U.S. transit

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[37] *EPA-Oregon* and *EPA-Washington*, accessed April 17, 2010: http://www.epa.gov/npdes/pubs/oregon.pdf and http://www.epa.gov/npdes/pubs/washington.pdf

[38] TriMet, *2009 Annual Report*, Footnote 1, "Organization and Summary of Significant Financial Policies," page 14, accessed May 9, 2010: http://trimet.org/pdfs/publications/TriMet_2009_Annual_Report.pdf

operator overall, the 20th largest bus operator, the 20th largest paratransit operator and the fourth largest light rail operator[39].

Besides approximately 80 bus lines, TriMet currently operates four Metropolitan Area Express (MAX) light rail lines, with more extensions planned[40]. TriMet also operates the City of Portland's streetcar system, which operates in and near the Portland CBD[41]. In 2009, TriMet began operating commuter rail (now classified by the Federal Transit Administration as "hybrid rail) service on the Westside Express Service (WES)[42].

On the Washington side of the Columbia, the Clark County Public Transportation Benefit Area Authority (C-TRANS) provides bus and demand-responsive service to Vancouver and the surrounding area and provides commuter bus service to Portland. For 2007, it provided approximately 6% of the unlinked passenger trips provided by TriMet[43].

Over the period being studied, UZA transit UPT/capita grew 29% and transit PM/capital grew 25%, placing Portland just outside the top ten UZA's of the total 74 for transit utilization growth, but more than any UZA with larger population.

Portland is one of the most interesting of the case study cities, in that it has made a major effort to deemphasize automotive travel in favor of transit, smart growth and non-motorized transportation. The transit regression results for Portland reveal no evidence that transit utilization has reduced traffic congestion. In fact, there is very clear quantitative evidence that transit usage has moved in the same direction as traffic congestion.

For Portland, we are *not* automatically dismissing these transit results as meaningless, as rogue results showing nothing but the relationship is so weak that the unexpected results just prove that there is no valid relationship. However, we are also *not* saying that increasing transit utilization in Portland causes congestion to increase. What we will do is to explore the possibility that the same body of public sector actions that have caused transit utilization to increase has also caused traffic congestion to worsen – at least, in the case of Portland.

Let us examine some of the unique aspects of Portland:

1. The first of TriMet's light rail lines, the Banfield line, was funded in part by $180 million in Federal Interstate Transfer funds derived from the decision to abandon the Mount Hood Freeway after a significant – and successful – local "freeway revolt" against that freeway[44].

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[39] *APTA 2009*, Tables 3, 24, 25, and 31. http://www.apta.com/resources/statistics/Documents/FactBook/APTA_2009_Fact_Book.pdf

[40] TriMet, "MAX Light Rail Project History," accessed May 18, 2010: http://trimet.org/about/history/maxoverview.htm

[41] "Portland Streetcar," accessed May 18, 2010: http://www.portlandstreetcar.org/

[42] TriMet, "WES Commuter Rail Project History," accessed May 18, 2010: http://trimet.org/about/history/wes.htm

[43] FTA, *NTD*, 2007 "Profiles" for C-TRAN and TriMet.

[44] *Oregon Encyclopedia*, "Mount Hood Freeway," accessed May 12, 2010:

(continued)

2. The construction of the Banfield light rail line required the elimination of a high-occupancy vehicle lane on the I-84 (Banfield Freeway), which the light rail line runs alongside. This HOV lane was short (approximately two miles in the eastbound direction and one mile in the westbound direction), but appeared to be very successful during the period it operated, from 1978 through 1982, when average daily total freeway traffic increased only 1.85% (over pre-opening 1977 traffic). The HOV obviously added a traffic lane in each direction, but it appears that its primary impact was encouraging former drive-alone's to carpool to reduce travel time while saving money. In 1986, the first year after the light rail line opened, average vehicle traffic increased 14.16% over 1982, the last year the HOV lane operated. Traffic volume increased an additional 10.65% in 1987, and continued the upward trend thereafter[45]. Therefore, the alignment selected for the placement of the first light rail line eliminated a highway resource that was having a positive impact on traffic congestion in a key commute corridor.
3. Oregon has a State-wide land use planning program, with Senate Bill 100 in 1973 as a key landmark in the program[46]. Oregon now has 19 Planning Goals to support its land use program[47]. Goal 14, "Urbanization," which spells out the Urban Growth Boundaries program states[48].

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http://oregonencyclopedia.org/entry/view/mt__hood_freeway/

[45] Oregon Transportation Institute, "HOV Lane/Light Rail Comparison," accessed May 12, 2010: http://www.portlandfacts.com/OTI/webdoc4.htm,

Detail traffic information is not available, but, it is likely that, in the present day, the HOV lane would have carried more transportation than the light rail line does.

For our current purposes, the two most relevant indicators are passengers pass a point and "transportation work," which, in this instance, means passenger-miles on a mile of guideway, both during the peak hour.

For light rail, TriMet operates a total of 18 trains on this segment on three light rail lines (Blue Line, 10; Green Line, 4; and Red Line, 4) between 7:00 a.m. and 8:00 a.m. in a westbound direction towards the Portland CBD. (TriMet, "Maps and Schedules," accessed May 12, 2010: http://trimet.org/schedules/index.htm). Assuming all trains are two-car consists, that would be 36 cars per hour and, assuming an average load of 75 (approximately all seats occupied, no standees), that would be 2,700 passengers/hour past a point. Assuming an average speed of 30 mph, including stops, each mile of light rail guideway would produce 81,000 peak hour passenger-miles.

The HOV lane was originally opened as HOV-3 (three passenger minimum occupancy to use), but was later changed to HOV-2 when HOV-3 did not generate sufficient traffic to use the available capacity. We will do the calculations both ways, but, by this time, there is a strong likelihood that usage of the HOV lane would increase to where it would be operated as HOV-3.

For HOV-2, we will assume average vehicle occupancy of 2.1; for HOV-3, 3.1. These could be increased if bus routes utilized the HOV lane. Assuming 1,000 vehicles an hour – which is conservative, HOV lanes of this type can approach 1,600 vehicles an hour without significant possibility of entering stop-and-go conditions – that would be 2,100 and 3,100 passengers, respectively, past a point. Assuming 55 mph average speed, the passenger-mile products would be 115,500 and 170,500, respectively.

Three of the four indicators – all but passengers past a point with HOV-2 – favor the HOV lane. As the assumptions are specifically tailored to favor light rail, in the real world, the results would likely be more favorable to the HOV lanes.

[46] State of Oregon, Oregon Department of Land Conservation and Development, "About Us," accessed May 12, 2010:
http://www.oregon.gov/LCD/about_us.shtml

[47] *Ibid.*, "Statewide Planning Goals," accessed May 12, 2010:
http://www.oregon.gov/LCD/goals.shtml

[48] *Ibid.*, "Goal 14:Urbanization," accessed May 12, 2010:
http://www.oregon.gov/LCD/docs/goals/goal14.pdf

> "Urban growth boundaries shall be established and maintained by cities, counties and regional governments to provide land for urban development needs and to identify and separate urban and urbanizable land from rural land."

4. Metro, the metropolitan planning organization (MPO) for the Portland UZA, has the unique position of having the only directly elected regional governing board in the U.S[49]. (Typically, MPO governing boards are composed of elected officials from local cities and counties.) Metro is also unusual for an MPO in that it has several direct operating responsibilities: the Oregon Zoo, the Oregon Convention Center, the Portland Center for the Performing Arts, and the Portland Metropolitan Exposition Center[50]. Metro also manages over 12,000 acres of parks and natural areas including over 100 miles of river and stream banks, and oversees the region's garbage and recycling programs (with one of the nation's highest recycling rates: 58%)[51]. Metro also has a limited direct taxing authority, which is also unusual (but not totally unknown) for a MPO[52].

   However, much of Metro's influence, over and above the norm for MPO's in the conventional planning process, stems from the combination of its directly elected governing board and its role as the local implementing agency for the Oregon urban growth boundary requirements, which gives it absolute control over expansion of the limits of where development can occur[53].

   Metro has adopted its *Regional Transportation Functional Plan* (Ordinance No. 10-1241B, § 5) which includes its "Interim Regional Mobility Policy standards for peak hour and mid-day demand-to-capacity ratios[54]." For the "Mid-Day One-Hour Peak," the standards are all .99, except for "Corridors, Industrial Areas, Intermodal Facilities, Employment Areas, Inner Neighborhoods, and Other Neighborhoods" and "Other Principal Arterial Routes," which are at .90. The two principal freeways, I-5 and I-84, are at .99. For the "PM 2-Hour Peak," the first hour standards are from .99 (for the two categories set at .90 for the Mid-Day Peak) to 1.1 for the rest. For the second hour all are .99.

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[49] Metro, "Mission, Charter, and Code," accessed May 12, 2010: http://www.oregonmetro.gov/index.cfm/go/by.web/id=24270

[50] Metro, "More From Metro," accessed May 12, 2010: http://www.oregonmetro.gov/index.cfm/go/

[51] Metro, "What is Metro," accessed May 12, 2010: http://www.oregonmetro.gov/discover/

[52] Metro, "The Metro Charter," accessed May 12, 2010: http://www.oregonmetro.gov/index.cfm/go/by.web/id=211/level=3

[53] *Ibid.*

[54] Effective 09/08/10, Referenced February 18, 2011: http://library.oregonmetro.gov/files//chap308.rtfp_clean_eff._090810.pdf, *Ibid.*, Table 3.08-2, page 32.

Road utilization is described, in transportation engineering terms, by "Level of Service," or "LOS:" six levels from "A" to "F," with "A" showing the least utilization and "F" the most – and there is an "E" in this grading scale[55].

Simplifying slightly, LOS F, on a freeway, is where traffic is no longer consistently flowing, even at reduced speed, and stop-and-go conditions begin. 1.00 is the absolute top end of the LOS E, the point where, if anything at all negative occurs, including literally one additional vehicle per lane per hour, LOS F – and stop-and-go traffic – will begin[56].

"Most design or planning efforts typically use service flow rates at LOS C or D, to assure an acceptable operating service for facility users[57]." Prior to the establishment of target capacity levels at .90 to 1.1, Portland set very different standards. "Historically, the RTP (regional transportation plan) has sought to maintain a level of service D, which represents a facility that is operating at 80 percent of capacity with relatively free-flowing traffic[58]."

By establishing the utilization/capacity ratios where it has, Metro is planning for traffic congestion or for most of its roads to be at LOS F during peak periods and on the edge of LOS F during off-peak hours. Most MPO's, and other transportation planning entities, adopt plans for non-congested roadway service and then fail to meet their planed results during peak periods. Metro, by planning for LOS F, or the absolute high end of the LOS E range, has been extremely successful in achieving its planned levels of traffic congestion.

5. I-5 is the primary West Coast north-south road between Seattle and Vancouver, B.C. in the north and California in the south and *the* major truck route for the three Pacific Coast states and cargo bound for Canada and Mexico. For most long-haul truck movements and all short-range movements in the region, there are no real alternatives to cross the Columbia River but the I-5 and I-205 bridges between Portland and the Washington side. There are also no alternatives to these two bridges for passenger car and transit travel between the Oregon and Washington sides of the Portland UZA.

   For many years, these bridges have represented a considerable bottleneck to "rubber tire" movements, which impact not only local travel within the Portland UZA, but also longer distance truck and travel movements. It was recently ranked Oregon's number one Transportation chokepoint with impacts described as follows[59]:

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[55] Transportation Research Board, *Highway Capacity Manual 2000* (*HCM 2000*), "Quality and Levels of Service," pp. 2-2/3.
[56] *HCM 2000*, "LOS," pp. 23-2/3.
[57] *HCM 2000*, "Service Flow Rates," page 2-3.
[58] Metro, "Implementing the Regional Transportation Plan – Evaluating Traffic Congestion," accessed March 3, 2011: http://saveportland.org/Misc_Docs/evaluating.pdf
[59] Trip, *Oregon's Transportation Chokepoints: The Top 50 Chokepoints and Remedies for Relief*, May 2010, accessed May 12, 2010: http://www.tripnet.org/Oregon_Chokepoints_Report_051310.pdf

> "Chokepoint causes the worst congestion in the metro region, one of the biggest bottlenecks on the I-5 trade corridor, congestion lasts 4-6 hours per day and is projected to increase to 15 hours by 2030. Reduces freight access to Port of Portland, 644,200 hours of freight delay per year, 300 accidents experienced annually."

The urban form plans and implementation on the Portland side of the river have resulted in significantly higher housing costs and reduced housing options there, causing many people with jobs in Oregon to live in Washington. This has led some members of the community to speculate that Portland leadership is not particularly interested in making the commute, particularly the drive commute, any easier for these Washington residents who work in Oregon. The capacity, form, and finances of the proposed Bridge have been under intense study for years. The most recent, and purportedly final, version of the bridge plan is a compromise, a pair of two-deck, five-lane (three through lanes and two "add/drop" lanes for entrance and exit) bridges, up from the current six total lanes, with two light rail tracks on the lower deck of one bridge and a walk/bike lane on the lower deck of the other[60]. This compromise gave the Washington side what it was most interested – adding road capacity, and a light rail line on the bridge was what the Oregon side wanted. The high cost of the bridge, more than the sponsors can fund from available sources, which is due in large part to the inclusion of the light rail line, has now made this into a toll bridge proposal[61].

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[60] Oregon Department of Transportation, U.S. Department of Transportation/Federal Highway Administration and Federal Transit Administration, Washington State Department of Transportation, C-Tran, Metro, TriMet, and RTC, *Final Environmental Impact Statement and Final Section 4(f) Evaluation: Columbia River Crossing, Interstate 5 Columbia River Crossing Project*, September 2011, Exhibit 2.2-2, "Locally Preferred Alternative Columbia River Crossing Cross-section," page 2-7.
http://www.columbiarivercrossing.org/FileLibrary/FINAL_EIS_PDFs/CRC_FEIS_Chapter2_S2.1_River_Crossing_and_Highway_S2.2_Transit.pdf

[61] Oregon Department of Transportation/Washington State Department of Transportation, *I-5 Columbia River Crossing Draft Environmental Impact Statement*, May 2, 2008, Section 2.3.5., "Tolling," accessed May 12, 2010.
http://www.columbiarivercrossing.org/Library/Type.aspx?CategoryID=26,

Dyland Rivera, "Beset By Money Woes, I-5 Bridge Looks at Cuts," *The Oregonian*, September 18, 2009, accessed May 12, 2010:
http://www.oregonlive.com/news/index.ssf/2009/09/beset_by_money_woes_i5_bridge.html

Eric Robinson, "I-5 Bridge Labeled Oregon's Worst Coke Point," *Columbian*, May 13, 2010, accessed May 12, 2010:
http://www.columbian.com/news/2010/may/13/i-5-bridge-labeled-oregons-worst-chokepoint/?print

Dyland Rivera, "Portland, Vancouver Leaders Say New I-5 Bridge Plan 'Unacceptable,'" *The Oregonian*, January 19, 2010, accessed May 12, 2010:
http://www.oregonlive.com/portland/index.ssf/2010/01/_portland_vancouver_political.html

There has actually been some speculation that there is a deliberate attempt to increase the cost of the proposed bridge to ensure it must be a toll bridge.

For example, the current design is for two double-deck bridges, with the lower deck on one for two light rail tracks and on the other, for a pedestrian/bicycle facility. Given that the upper deck of the bridges is five lanes, there appears to be sufficient room to place both the two light rail tracks and the pedestrian/bicycle facility on the lower deck of one bridge, including safe separation of the uses (the static/dynamic loads of the pedestrian/bicycle uses are very minor compared to those of the light rail trains and the rubber tire vehicles on the upper deck). This would allow one of the bridges to be built as a single deck facility at a savings that is likely to be far greater than the costs of adding the pedestrian/bicycle facility to the other bridge.

(continued)

Although the defeat of a local transit sales tax issue in Clark County[62], where the Washington side of the bridge is proposed to land, does not currently appear to have dealt a fatal blow to the project, other issues include the surprisingly late unearthing that the proposed bridge has lower clearance for larger water vessels than the current lift bridge[63] – which the project team is attempting to overcome[64].

6. The City of Portland has an adopted "Comprehensive Plan Transportation Goal And Policies," which contains the following elements[65]:

> **"Policy 6.3 No New Regional Trafficways:** The Regional Trafficway system within the City of Portland is complete. Any future increases in regional traffic should be accommodated by improvements to the existing trafficways and not by building new corridors for circumferential freeways within the City. Specifically, the proposed Western Bypass should not be extended north of U.S. 26 into the City, through Forest Park, and across the Willamette and Columbia Rivers."
>
> **"Policy 6.6 Urban Form:** Support a regional form composed of mixed-use centers served by a multimodal transportation system. New development should be served by interconnected public streets, which provide safe and convenient pedestrian, bicycle, and vehicle access. Street and pedestrian connections should be provided to transit routes and within and between new and existing residential, commercial, and employment areas and other activity centers."
>
> **"Policy 6.7 Public Transit:** Develop transit as the preferred form of person trips to and from the Central City, all regional and town centers, and light rail stations. Enhance access to transit along main streets and transit corridors. Transit shall not be viewed simply as a method of reducing peak-hour, work-trip congestion on the automobile network, but shall serve all trip types. Reduce transit travel times on the primary transit network, in the Central City, and in regional and town centers, to achieve reasonable travel times and levels of reliability, including taking measures to allow the priority movement of transit on certain transit streets. Support a public transit system that addresses the special needs of the transportation disadvantaged."

There has also been considerable speculation that the costs of the total project that has been allocated to light rail is lower than it should be, particularly if the costing were to be done on a "marginal" cost basis, which in this case would be a comparison of the costs of the project as proposed vs. the cost of the bridges and other road work without light rail.

[62] Eric Florip, "Voters Soundly Reject C-Tran Measure – Outcome Delivers Potential Setback to Columbia River Crossing, *The Columbian*, November 6, 2012, accessed April 1, 2013: http://www.columbian.com/news/2012/nov/06/voters-soundly-reject-c-tran-measure-outcome-deliv/

[63] Andrea Damewood, "Official: Planned I-5 Bridge Too Low – Coast Guard Says Clearance Won't Meet Needs of Ships," *The Columbian*, May 2, 2012, accessed April 1, 2013: http://www.columbian.com/news/2012/mar/02/official-planned-bridge-too-low/

[64] Columbia River Crossing project, "CRC Submits General Bridge Permit Application to U.S. Coast Guard," press release, March 1, 2013, accessed April 1, 2013: http://www.columbiarivercrossing.org/Newsroom/Article.aspx?ID=85

[65] City of Portland, "Comprehensive Plan Transportation Goal And Policies," accessed May 12, 2010: http://www.portlandonline.com/shared/cfm/image.cfm?id=84804

> **"Policy 6.8 Regional Rail Corridors:** Assign priority to the funding and development of the regional mass transit system to reduce both the need for new regional traffic facilities and reliance on the automobile. Decisions on light rail transitway alignments and their connections to other regional facilities will be based on individual corridor studies. Regional Transitway designations in the northern and southern corridors represent alternative alignments for future light rail transitways. The Transportation Element will be amended to show the chosen alignment as determined by the Draft Environmental Impact Statement process and as adopted by City Council. Funding decisions for light rail transit corridors should be based upon the population served, the opportunities for redevelopment, and the traffic congestion problems in the corridors."
>
> **"Policy 6.9 Transit-Oriented Development:** Reinforce the link between transit and land use by increasing residential densities on residentially-zoned lands and encouraging transit-oriented development along Major City Transit Streets and Regional Transitways, as well as in activity centers, at existing and planned light rail transit stations, and at transit centers in conformance with the Comprehensive Plan and Zoning Code."

Portland has also adopted a policy which gives priority to transit vehicles, "It is the goal of the Transit Preferential Streets Program to improve transit travel times and service by giving priority to transit vehicles where conflicts with autos occur," originally implemented on five arterial streets with transit lines and since expanded[66].

7. Despite 86.3% of home-to-work commutes being on roads, vs. 4.9% for transit, a ratio of 17.6:1, and an even higher ratio for non-work-commute trips, and none of the freight traffic moving on transit, Metro is allocating 48.6% of combined road and transit funding through 2035 for roads, and 51.4% for transit[67].

The previous seven decisions show that surface transportation decisions in the Portland UZA have been significantly shifted toward transit and towards transit funding. This includes policies and actions such as shifting funding for an approved Interstate highway to a light rail line, taking out a very productive HOV lane for the light rail line, holding up action for a vital Interstate river

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[66] City of Portland, *Transit Preferential Street Program – Final Report,*" July 1997, page 1, accessed May 12, 2010: https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/5673/Portland_Transit_Preferential_Streets_Program.pdf?sequence=1

[67] Census Bureau, American Community Survey 2006-2008, Tables B01003 (Total Population), B08136 (Aggregate Travel Time to Work of Workers [16 or older] by Means of Transportation to Work), and B08301 (Means of Transportation to Work [16 and older]), accessed September 3, 2009. http://www.census.gov/acs/www/

ECONorthwest for Metro, "Preliminary Financial Analysis for the Metro 2035 RTP (regional transportation plan) Update," December 2006, Table 4-3, "Summary of Estimated Total Costs for Road and Transit in the Region, by OM&P (Operating, M) and Capital Improvements, 2007-2035, page 4-9, accessed July 14, 2010: http://library.oregonmetro.gov/files/rtp_preliminary_financial_analysisfinal.pdf

crossing until a light rail line is included in the project and providing preference to transit over automobiles on arterial streets. This body of pro-transit, sometimes anti-road policies and actions, combined with the quantitative results over the time period, provide support for the contention that the Portland area policies designed to increase transit usage have created situations where traffic congestion has increased.

Again, it is *not* the increase in transit utilization that has caused the increase in congestion; it is the body of decisions to favor transit over roads that have caused the increase in congestion.

PLAN AND DEIR TRANSPORTATION AND LAND USE MODEL OUTPUTS HAVE HIGH ERROR RATES – WHICH ARE NOT DISCLOSED TO DECISION-MAKERS AND THE PUBLIC

In considering the outputs of transportation and land use models, it must always be kept in mind that, at best, these produce results that are approximations of reality, not recreations, and that their results are very far from precise.

To illustrate how this works, let us take, as an example, the below:

SAN FRANCISCO BAY AREA TRANSIT OPERATORS
DAILY TRANSIT BOARDINGS, 2010

Mode	Average Weekday Ridership
Motor Bus	713,403
Trolley Bus	209,629
Cable Car	22,353
Light Rail	189,784
Heavy Rail*	397,814
Ferry	9,608
Paratransit	14,293
Total	1,556,884
DEIR Value	1,581,000
Difference (Numerical)	24,116
Difference (Percentage)	1.55%

* Heavy Rail includes Commuter Rail and Rapid Transit

Sources

All data except "DEIR Value" from MTC, *Statistical Summary of Bay Area Transit Operators - Fiscal Years 2006-07 Through 2010-11*, June 2012, "Bay Area System -- Statistical Summary Totals," page 5, accessed April 18, 2013: http://www.mtc.ca.gov/library/statsum/StatSumm_2011.pdf (Asterisked note is from source document.)

"DEIR Value" from Association of Bay Area Governments/Metropolitan Transportation Commission, *Plan Bay Area 2040 Public Review Draft Environmental Impact Report*, April 2013, Table 2.1-12: Bay Area Travel Behavior, 2010-2040, page 2.1-28.

The "DEIR Value" of 1,581,000 shown above is taken from the table in the DEIR referenced, where it is labeled, "Daily Transit Boardings" (which has the same meaning as "Average Weekday Ridership" for our instant purposes).

In modeling for long-range transportation plans such as the *Plan* and DEIR, the common practice is to calibrate the transportation model by "predicting" the past and then fine-tuning the workings of the model to get the outputs reasonably close to the known values, in this case, the Average Weekday Ridership taken from an MTC publication. Then, in tables in such plans, the usual practice, when presenting data that includes both base year and predicted future year values, is to present the model outputs for both the predicted future years *and for the base year* (I do not know for a fact that this is what ABAG/MTC have done in their presentations in the DEIR, but, if this is *not* what they have done, the variance from actual known values in the referenced DEIR Table needs explanation; it is, for example, possible that the model was calibrated to a different value for Daily Transit Boardings, which would then raise the question of why that value does not match the one reported by MTC for daily transit trips).

To put this in perspective, this error rate is not unusual in this type of modeling, nor is it at variance with currently accepted transportation and land use modeling practices. Most likely, after extensive work to refine and calibrate the models, the modelers reached a point of diminishing returns where any additional fine-tuning to better match the actual, known value of 1,566,884 average weekday boardings would be contra-indicated for various reasons – for example, the attempt to improve the accuracy of the prediction of average weekday transit boardings could have produced a higher rate of error for other values that are being predicted by the model, such as Daily Vehicle Trips or Daily Vehicle Miles of Travel, which also appear in Table 2.1-12 in the DEIR, or just that, in the professional opinions of the planners and modelers working on the DEIR, this was about as close as it was possible to get[68].

I note that the Daily Transit Boardings, and other values shown in Table 2.1-12, are all rounded to the nearest thousand, such as the 1,581,000 for Daily Transit Boardings. This rounding reflects that model is not sufficiently precise to produce meaningful values down to hundreds, tens, or unit values and therefore, producing values with a higher level of precision is not appropriate or justified, that thousands are as precise as the model can produce – and that expressing values in thousands is probably as precise as most users can process.

However, in scientific notation, the concept of "significant digits" mandates that, if it is not possible to predict down to units, tens, or hundreds, then units, tens, and hundreds should not be shown in the presentation of the value, what should be shown is not 1,581,000, but $1{,}581 \times 10^4$.

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[68] It must also be recognized that ridership data, as reported to FTA under NTD, has its own error rate. For example, the current Federal reporting requirement is, "Passenger miles are to be estimated with confidence and precision levels of 95% and 10%, respectively." (Because passenger miles are an input into the Federal 49 USC 5307 "formula" grant funding methodology, the ridership reporting methodology is primarily geared to passenger miles; however, the methodology are designed to report both passenger miles and unlinked passenger trips and it is reasonable to conclude that the confidence and precision for both are comparable. (FTA, Circular C 2710.1A, "Sampling Procedures For Obtaining Fixed Route Bus Operating Data Required Under the Section 15 Reporting System," July 18, 1988, Footnote 1, page I-1.)

However, even this is not proper presentation; because, as can be seen by the comparison with the actual values reported – in a document published by MTC – the actual number was *not* 1,581 x 10^4, but 1,556,884.

Therefore, under the concept of significant digits, it is not proper to present Daily Transit Boardings as 1,581 x 10^4, because the "1" – the thousands digit – is not significant.

Nor is the "8" – the ten thousands digit.

In fact, applying the concept of significant digits, the proper methodology to present Daily Transit Boardings in Table 2.1-12 is 1.6 x 10^7 – in this particular, the outputs of the model are only precise to the hundred thousands digit.

The production of tables using statistics with meaningless precision and useless additional digits is improper for a variety of reasons, high among them that it displays to the reader a high level of precision that does not exist. This improper methodology is used extensively throughout the *Plan* and DEIR.

The important point here is that the models used in the production of the *Plan* and DEIR have a demonstrable 1.55% error rate for this statistic *in predicting the past*.

It is unchallengeable that their error rates in predicting the future will be significantly higher – yet, the presentation of statistics in the *Plan* and DEIR not only fail to follow proper standards for presentation of significant digits and confidence and precision, but do not even acknowledge that such concepts exist.

In Table 3.1-8: Bay Area Travel Behavior, 2010-2040, we see ranges of values, highest to lowest, for the four non-Non Project alternatives of:

Daily Transit Boardings	8.3%
Daily Vehicle Miles of Travel	5.6%
Intraregional Daily Vehicle Trips	7.4%
Interregional Daily Vehicle Trips	4.9%

The decision-makers and the general public of the Bay Area are being told that the outputs of these models, with these rather small range of outcomes between alternatives, are primary justifications for decisions that will have major impacts on all aspects of the Bay Area for uncountable generations to come – without being told that the accuracy of the models to produce statistically significant differing results that are meaningful for this purpose is highly questionable.

(It may be argued that, although the absolute value of the results produced by such modeling may not have high precision, because each alternative is modeled in the same way, any errors in process would affect all alternatives the same way, and therefore the ***relative*** differences are significant and **a*re* a** proper basis for such decision-making. This simply cannot be accepted

because, by definition, the different alternatives are different in various ways, and it cannot be expected that model results from widely different types of long-term plan elements will all have the same error rates – or even that the errors will all be in the same direction.)

Accuracy of Predictions of Transportation Project Capital and Operating Costs and Ridership

The accuracy – or lack thereof – of long-term plan models is a major subject of discussion in referred journals and elsewhere. Some of the classics in this field include[69]:

Pickrell[70]

In one of the first comprehensive comparisons of planning projections vs. actuality for major transit capital projects, Dr. Pickrell found, in his evaluation of ten rail transit projects (from Table S-1, "Forecast and Actual Cost Per Passenger for Recent Rail Transit Projects"):

- Actual ridership ranged from 28% to 85% below projections for the nine projects with data, for a simple average of 65% lower.
- Actual capital cost ranged from 11% lower to 103% higher than projected, for a simple average of 50% higher
- Annual operating expenses ranged from 10% lower to 205% higher than projected for the eight projects with data, for a simple average of 78% higher.
- Total cost per rail passenger ranged from 188% to 872% higher than projected for the seven projects with data, for a simple average of 497% higher

Wachs[71]

Profession Wachs, one of the most distinguished practitioners in the field of transportation planning education and research, has long had a major interest in ethic in planning and public policy.

The quote below is specifically directed towards Pickrell's work:

> "I have interviewed public officials, consultants, and planners who have been involved in these transit planning cases, and I am absolutely convinced that the cost overruns and patronage overestimates were not the result of technical errors,

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[69] Most of the papers below focus on individual transportation projects, as opposed to transportation programs or regional long-range plans; however, the modeling process, and the models used, are generally very comparable, often identical, and a large part of the *Plan* and DEIR involves the analysis of the sum of the impacts of individual projects, all of which must be specifically entered into the models in order for that evaluation to be performed.

[70] Don H. Pickrell, Transportation Systems Center, Research and Special Programs Administration, U.S. Department of Transportation, for Urban Mass Transportation Administration, U.S. DOT, *Urban Rail Transit Projects: Forecast Versus Actual Ridership and Cost*, October 1990: http://www.debunkingportland.com/docs/Pickrell(no_text).pdf

[71] Martin Wachs, "Ethics and Advocacy in Forecasting for Public Policy," *Business and Professional Ethics Journal*, vol. 9, Nos. 1 & 2,

> honest mistakes, or inadequate methods. In case after case, planners, engineers, and economists have told me that they have had to "revise" their forecasts many times because they failed to satisfy their superiors. The forecasts had to be "cooked" in order to produce numbers which were dramatic enough to gain federal support for the projects whether or not they could be fully justified on technical grounds. One young planner, tearfully explained to me that an elected county supervisor had asked her to estimate the patronage of a possible extension of a light-rail (streetcar) line to the downtown Amtrak station. When she carefully estimated that the route might carry two to three thousand passengers per day, the supervisor directed her to redo her calculations in order to show that the route would carry twelve to fifteen thousand riders per day because he thought that number necessary to justify a federal grant for system construction. When she refused, he asked her superior to remove her from the project, and to get someone else to "revise" her estimates."

It is widely understood in the transit industry that the project described in the latter part of the paragraph was in the Bay Area and the individual mentioned was very prominent on the governing boards of both ABAG and MTC for many years.

McFadden[72]

Professor McFadden's paper included the following comparisons of projected modal choices vs. actual page 335):

Table 1. Prediction Success Table, Journey to Work
(Pre-BART Model and Post-BART choices)

Cell Counts	**Predicted Choices**				
Actual Choices	Auto Alone	Carpool	Bus	BART	Total
Auto Alone	255.1	79.1	28.5	152.2	378
Carpool	74.7	37.7	15.7	8.9	137
Bus	12.8	16.5	42.9	4.7	77
BART	9.8	11.1	6.9	11.2	39
Total	352.4	144.5	94.0	40.0	631
Predicted Share	55.5%	22.9%	14.9%	6.3%	
(Std. Error)	(11.4%)	(10.7%)	(3.7%)	(2.5%)	
Actual Share	59.9%	21.7%	12.2%	6.2%	

What the table shows is that, while BART's planners had predicted a BART modal share of 15% (a number that does not appear in the Table above), McFadden and his team predicted a 6.3% share for BART – and that the actual came in at 6.2%.

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[72] Daniel L. McFadden, "Economic Choices," Prize Lecture, December 8, 2000: http://www.nobelprize.org/nobel_prizes/economics/laureates/2000/mcfadden-lecture.pdf

This is remarkable for three reasons:

1. The BART predictions, done using traditional "gravity" models still in widespread use today, were very high, well over double the actual, while McFadden's methodology was almost dead on mark.
2. The "where" this comparison was made is interesting: in Prof. McFadden's Prize Lecture after being awarded the 2000 Nobel Prize for Economics – it is rather notable that a Nobel Laureate's prize address would comprehend the failures of transportation modeling in the Bay Area.
3. Finally, in an adaptation of this paper[73], published as a tribute to Prof. McFadden in *Access*, the University of California's magazine for Transportation Research, he ended it with:

> "Over the 25 years that have passed since the Urban Travel Demand Forecasting Project was completed, discrete-choice analysis has become a standard tool not only in transportation planning, but also in marketing, finance, political science, and applied economics. It met a need. Today, if you go to London, Paris, or Hong Kong, you'll find that these tools have been integrated into transportation system facilities planning and operations.
>
> "Of course, as they say, no one is a saint in his own country. As far as I know, BART management is unaware that the tools available for transportation policy analysis have changed since 1970."

(At least, this has changed since Prof. McFadden wrote that – MTC's current transportation model is activity-based, not a typical four-step – trip generation, trip distribution, mode choice, traffic assignment – and it does utilize discrete choice techniques, such as for modal choice – but, as I have discussed above, there are other problems with how the model is utilized.)

Flyvbjerg[74]

Prof. Flyvbjerg has published a large number of papers on problems with cost and ridership projections in public works projects, with transportation projects, particularly road, bridge, and transit projects, being of special interest to him.

The following is the abstract one of his most widely cited papers, which was published in the Journal of the American Planning Association:

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[73] Daniel L. McFadden, "the Path to Discrete-Choice Models," *Access*, Spring 2002, Number 20: http://www.uctc.net/access/access20.pdf

[74] Bent Flyvbjerg, Mette Skamris Holm, and Søren Buhl, "Underestimating Costs in Public Works Projects – *Error or Lie?*", Journal of the American Planning Association, Summer 2002, vol. 68, No. 3., pp 279-295: http://flyvbjerg.plan.aau.dk/JAPAASPUBLISHED.pdf

> "This article presents results from the first statistically significant study of cost escalation in transportation infrastructure projects. Based on a sample of 258 transportation infrastructure projects worth US$90 billion and representing different project types, geographical regions, and historical periods, it is found with overwhelming statistical significance that the cost estimates used to decide whether such projects should be built are highly and systematically misleading. Underestimation cannot be explained by error and is best explained by strategic misrepresentation, that is, lying. The policy implications are clear: legislators, administrators, investors, media representatives, and members of the public who value honest numbers should not trust cost estimates and cost-benefit analyses produced by project promoters and their analysts."

Federal Transit Administration/SG Associates, Inc.[75]

"Section 3011(a) of the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SFETEA-:LU) amends 49 U.S.C., 5309/g)(2)(c) and 5309(1) to direct FTA to summit an annual report to Congresses summarizing the results of all Before and After Studies completed and received during the prior year from New Starts[76] project sponsors.

"The annual report analyzes the Impact that a New Starts project has on transit services and readership, evaluates the consistency of predicted and action project characteristics and performance, and identifies sources of differences between predicted and actual outcomes[77]."

In 2003, the Federal Transit Administration did its first comprehensive evaluation of projected and actual impacts of New Start projects, which found, in an analysis of 21 guideway transit projects:

- The average As-Build Capital Cost, adjusted for inflation, was 21% over the Alternatives Analysis (AA)/Draft Environmental Impact Statement (DEIS)[78], 14% over the Final EIS (FEIS), and 7% over the full-funding grant agreement (FFGA) cost (Appendix, page 8)
- For the 19 projects with data, the Actual Operating and Maintenance Costs were 2% under the AA/DEIS and 1% under the FEIS costs (page 24), but this comparison does not fully reflect that the O&M cost estimates were for out years with higher ridership than was currently being experienced, which translated into lower levels of service operated and lower costs (pages 24-5)
- For the 19 projects with data, the actual ridership – projected out to future forecast years (the years the ridership in the AA/DEIS and FEIS were projected to occur), where necessary because the forecast year had not yet been reached, by FTA by using the average annual rate of ridership growth, were 31% under AA/DEIS and 38% under FEIS

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[75] Federal Transit Administration with support from SG Associates, Inc., *Projected and Actual Impacts of New States Projects – Capital Cost, Operating Cost and Ridership Data*, September 2003: http://www.fta.dot.gov/documents/CPAR_Final_Report_-_2007.pdf

[76] New Starts projects are those funded by discretionary capital grants under 49 USC 5309.

[77] FTA, "Before and After Studies," accessed May 10, 2013: http://www.fta.dot.gov/12907_9197.html

[78] Pickrell's comparisons are primarily to DEIS' (Section 1.3, page 3).

projected ridership (page 32). "Raw" ridership – not adjusted for anticipated future growth to the forecast year – simple average, was 35% under AA/DEIS and 36% under FEIS projections (page 31).

The paper did note a trend that more recent ridership projections were superior in accuracy to earlier ones (page 38).

Since the first "Before and After" report referenced above, FTA has submitted seven subsequent reports to Congress (including three with no projects evaluated), with results as follows (numbers in parenthesis are the number of projects with usable data)

INCREASES/(DECREASES) FROM PROJECTIONS TO ACTUAL			
	Change to Construction/Operations From		
	AA/MIS	**DEIS**	**FFGA**
Initial Capital Cost	41% (5)	24% (4)	21% (6)
Operating Cost	1% (3)	5% (3)	10% (3)
Ridership	(14)% (2)	(4)% (2)	(20)% (5)

Conclusions

What these values reflect is the well-known phenomenon that the accuracy of projects improves markedly as projects progress from initial conception to conceptual planning to detail planning to preliminary design to final design to actual completion – the earlier in the process, the larger the range of estimate, or error rate.

This is also due to another well-known phenomenon that, as the projects progresses from conception to operation, there is a tendency to "Christmas Tree" it – for example, adding a station on rail or BRT line, perhaps to obtain the support of a key elected official, doing significant improvements in street architecture, such as brick, or marble, pavers, street furniture such as planters, seating, and period light posts to get approval to build through a city, etc. – as well as conditions that were not known until detailed site surveys are performed – and, frequently, not until construction commences – such as underground rivers or soil that requires different, and more expensive, tunneling techniques than previously anticipated, Native American burial sites, and any number of other conditions.

What this means is that, the earlier a project, or a program of projects, is in the concept-planning-design-construction-operations cycle, the higher the degree of risk and the higher the required contingency – and that a major share of the projects and programs in the *Plan* and DEIR are relatively early in this process.

These risks also apply to project schedule, with it being very common to major projects of this sort to be delayed years longer than the originally anticipated schedule (for example, the East Span of the Bay Bridge, which was intended to address the very serious seismic safety risks that become so apparent after the 1989 earthquake collapsed part of the upper deck onto the lower deck (and onto a most unfortunate motorist), is now scheduled to open for service on Labor Day,

approximately 24 years after that incident (that assumes that the current problem regarding the breakage of the key bolts is resolved by then, and that there are no other issues that come into play) – which, I submit, is far longer than anyone anticipated at the time. The old saying, "time is money," is exceeding true in transportation project planning and execution, due to having to maintain the planning, design, and construction staffs longer than anticipated, Federal, State, and certain other grants being made in nominal dollars that do not increase with inflation or cost of construction when work is delayed, new requirements appearing, such as changes in law or regulation that add unanticipated costs, etc.

Most of the reports above use, as a starting point for analysis of change, data from a point fairly far along the concept/planning/design/construction/operating/capital renewal and replacement continuum – such as DEIR's for Pickrell and AA/MIS for most of the FTA projects evaluated. However, in reality, decisions to proceed with projects are often effectively made long before even AA/MIS work begins, including presenting ballot measures to voters to approve funding for projects. Again, the earlier in the process for a projection, the higher the likelihood of an "error" – or other discontinuity between projection and actual – ***and many of the specific projects in the Plan and DEIR are currently very early in that process.***

When this is combined with the Bay Area's exceedingly poor record of bringing transportation projects in on budget and on schedule, meeting technical specifications, and achieving anticipated objectives such as ridership, the fiscal soundness of the *Plan* and DEIR are at significant risk – specifically:

- A search of the DEIR for "contingency" finds it used only in references to ***soil*** contingencies.

- A search for "reserve" finds a single usage in a financial context, that on page 1.2-50, where there is a reference to a "$2 billion reserve" – just under Table 1.2-10: Transportation Investments of Plan Bay Area vs. RTP 2035, where the total Budget is shown as $289 billion.

This is an effective program reserve (I am assuming that standard practices are utilized, which call for reserves in each individual project budget, and perhaps also individual program budgets – I request that this be specified, in detail, in the response to this comment letter in the FEIR) of .7%.

At this stage in the development of programs and projects, with knowledge of the past history of the Bay Area transportation and local government agencies in bringing projects to completion, based on my decades of extensive professional experience in this field, I would not be comfortable recommending a 20% reserve.

And I would still anticipate that many projects will be delayed, or cancelled, due to lack of available funding, when required, to initiate and/or complete them as per the original schedule.

TRANSIT DOES NOT USE LESS ENERGY, OR PRODUCE FEWER EMISSIONS, THAN CURRENT GENERATION AUTOMOBILES – AND AUTOMOBILES ARE GETTING BETTER WHILE TRANSIT IS NOT.

I attach two papers (Appendix B and Appendix C, respectively), one by Randal O'Toole of Cato Foundation and one I authored, which show that transit, on a national basis, does not have any energy or emissions advantages over modern automobiles and that automobiles are getting significantly better in this regard while transit is not.

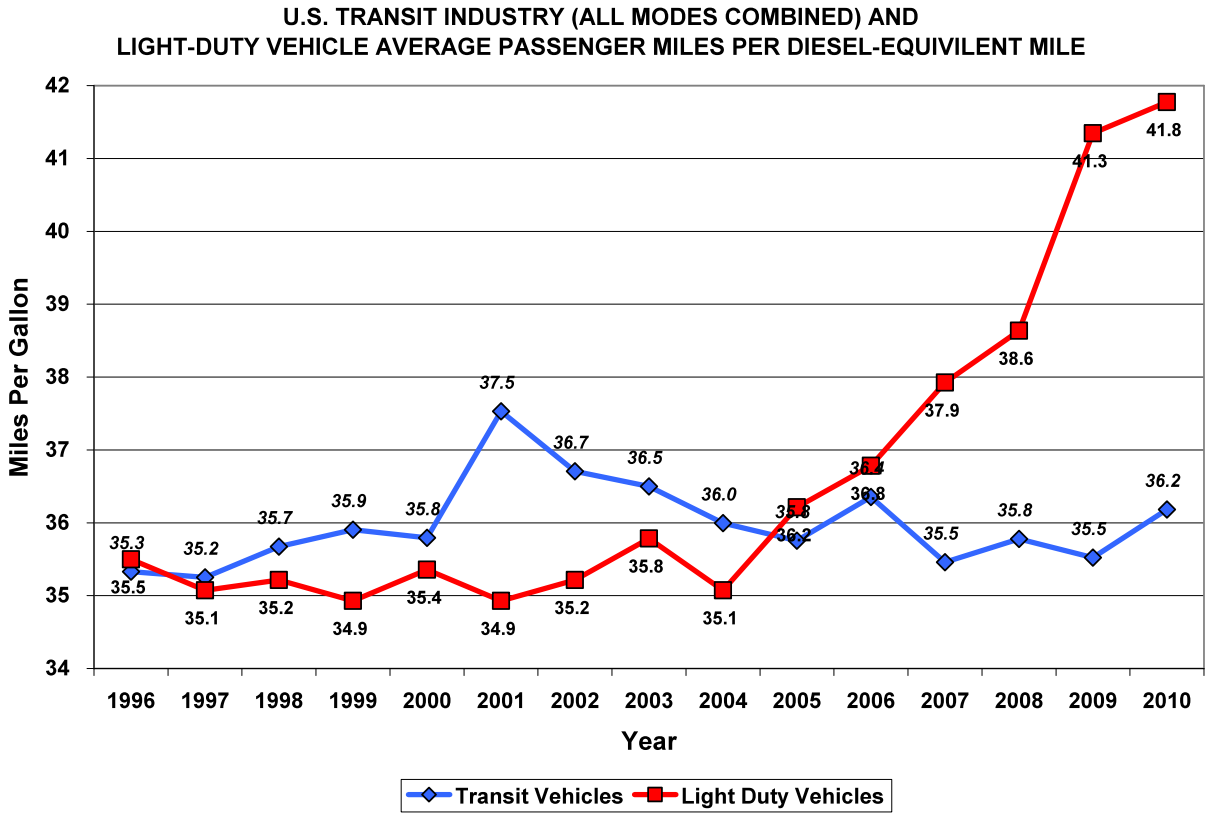
> Randal O'Toole, *Does Rail Transit Save Energy or Reduce Greenhouse Gas Emissions?*, Cato Policy Study 615. April 14, 2008:

http://www.cato.org/publications/policy-analysis/does-rail-transit-save-energy-or-reduce-greenhouse-gas-emissions

> Thomas A. Rubin, *Does Bus Transit Reduce Greenhouse Gas Emissions?*, Reason Foundation, April 5, 2010:

http://reason.org/news/show/does-bus-transit-reduce-greenhouse

The growing energy usage advantage of light duty vehicles – passenger cars and light trucks (pickup trucks, vans, mini-vans, sports utility vehicles, and other four-wheel vehicles) over transit in terms of energy per passenger mile can be seen from the graph below:



Transit data is from American Public Transportation Association, *2013 Transit Fact Book: Appendix A: Historical Tables*, Tabs 3 (Passenger Miles), 38 (Electric Power Consumption), and 39 (Fossil Fuel Consumption). All fossil fuel consumption is reported to NTD (the source of the APTA Fact Books) in diesel gallon equivalents by British Thermal Unit (Btu); electric kilowatt hours are converted to diesel gallon equivalents using a factor of 1 kWhr = 10.339 Btu (Stacy C. Davis and Susan W. Diegel (Oak Ridge National Laboratory) and Robert G. Boundry (Roltek, Inc.), *Transportation Energy Data Book*: Edition 31, July 2012, Oak Ridge National Laboratory for Vehicle Technology Program, Office of Energy Efficiency and Renewal Energy, U.S. Department of Energy, Table B.6, "Energy Unit Conversion," page B-7.

Light Duty Vehicles (passenger car and light trucks, which includes vans, minivans, SUV's, and four-wheel pickup trucks) data starts with *Transportation Energy Data Book*, Table 4.21, "Car Corporate Average Fuel Economy (CAFÉ) – Standards versus Sales-Weighted Fuel Economy Estimates, 1978-2011, Cars and Light Trucks Combined, page 4-22. It is assumed that the all data is for gasoline motor fuel, which is converted to diesel equivalents using data from Table B.4, "Heat Content for Various Fuels," page B-5, of 115,400 Btu/gal (net) for conventional gasoline and 128.700 Btu/gal (net) for diesel motor fuel, for a conversion factor of .8967 (this slightly understates actual light duty vehicle mileage, as there is a small number of diesel-powered light duty vehicles). VMT was converted to passenger miles traveled by the 1.59 average vehicle occupancy for 2000 (footnote 34).

While transit energy efficiency changes very little over this period (up 2.5% over a fifteen year period) – and there is little reason to expect significant change in the future, particularly in a

positive direction – automobiles and light duty trucks show a very significant upward mileage trend since 2004, and, in 2010, has a 12% advantage – which can only be expected to widen considerably as CAFÉ moves toward 54.5 mpg.

CO_2 creation is roughly proportional to energy utilization.

MTC IGNORES THE "FISCAL CONSTRAINT" REQUIREMENT FOR TRANSPORTATION PLANS, AS WELL AS THE BAY AREA'S LONG AND CONSISTENT HISTORY OF MAJOR COST OVERRUNS, PROGRAM/PROJECT DELAYS, AND FAILURES TO ACHIEVE ANTICIPATED TRANSPORTATION RESULTS

On page ES-6 of the Draft Environmental Impact Report, *Draft Bay Area Plan – Strategy for a Sustainable Region*, April 2013 DEIr, we have the following claim:

> "*The proposed Plan includes a financially constrained transportation* investment *plan as required by State and federal planning regulations*. [Italics added.] It includes transportation projects and programs that would be funded through existing and future revenues that are projected to be reasonably available to the region over the timeframe covered by the proposed Plan."

On page 1.2-11 of the DEIR, we have:

> "Under MAP-21, the U.S. Department of Transportation requires that metropolitan planning organizations, such as MTC, prepare long-range transportation plans and update them every four years if they are in areas designated as "nonattainment" or "maintenance" for federal air quality standards. *Plan Bay Area fulfills this requirement*. [Italics added.] Prior to enactment of MAP-21, the primary federal requirements regarding RTPs were included in the metropolitan transportation planning rules—Title 23 CFR Part 450 and 49 CFR Part 613. MAP-21 makes a number of changes to the statutes that underpin these regulations, and revisions to the regulations are expected to be made in early 2013. Key federal requirements for long range plans include:
>
> …
> - "RTPs must have a financially constrained element, *transportation revenue assumptions must be reasonable* [italics added], and the long range financial estimate must take into account construction-related inflation costs."

On page 1.2-12, we have:

> "The RTP Guidelines adopted by the California Transportation Commission (CTC) state that the CTC cannot program projects that are not identified in the RTP. Section 65080 states that the RTP shall contain three distinct elements:
>
> …
> - "A **Financial Element** that summarizes the cost of implementing the projects in the RTP in a financially constrained environment."

On page 1.2-13, we have:

> "Further, the TIP is also financially constrained by year (meaning that the amount of dollars programmed must not exceed the amount of dollars estimated to be available in that year)."

On page 62 of the Draft *Plan Bay Area*, we have Figure 1, "Plan Bay Area Funding: 28-Year Forecast, which shows $14 billion, or 5%, of the total revenue from a source or sources labeled "Anticipated," which is explained as:

> "Making up the remainder of the pie are state and federal revenues (mainly derived from fuel taxes), and "Anticipated" revenues, which are unspecified revenues that reasonably can be expected to become available within the plan horizon."

And on page 64 of the Draft *Plan*:

> "MTC performed a retrospective analysis of projections for previous long-range plans, including a review of unexpected revenues that had come to the region but had not been anticipated or included in those projections. Over a 15-year analysis period, the San Francisco Bay Area received an annualized amount of roughly $400 million (in 2011 dollars) from these "unanticipated" fund sources. MTC generated an estimate of these anticipated revenues by projecting the $400 million figure forward at a 3 percent annual growth rate. These revenues are not assumed in the first five years of the plan."

The following is taken from the Federal Highway Administration "Financial Planning and Fiscal Constraint for Transportation Plans and Programs Questions & Answers[79]:"

> **"1. What are the differences between future revenue sources that are "reasonably expected to be available" and those that are "available" or "committed?"**
>
> "Revenue forecasts that support a Statewide Transportation Improvement Program (STIP), metropolitan transportation plan, or a metropolitan Transportation Improvement Program (TIP) may take into account new funding sources and levels of funding not currently in place, but which are "reasonably expected to be available" [see 23 CFR 450.216(m), 23 CFR 450.322(f)(10)(ii), and 23 CFR 450.324(h), respectively]. New funding sources are revenues that do not currently exist or that may require additional actions before the State DOT, MPO, or public transportation operator can commit such funding to transportation projects. In addition, future revenues may be projected based on historic trends, including consideration of past legislative or executive actions. To be considered "reasonable," the financial information and financial plans that accompany the TIP, STIP, and metropolitan transportation plan must identify strategies for

[79] http://www.fhwa.dot.gov/planning/guidfinconstr_qa.cfm

> ensuring the availability of these new revenue sources in the years when they are needed for project development and implementation [see 23 CFR 450.216(m)].
>
> "In air quality nonattainment and maintenance areas, the fiscal constraint requirements are more stringent. To support air quality planning under the Clean Air Act, as amended in 1990, the U. S. Environmental Protection Agency's transportation conformity regulations specify that an air quality conformity determination can only be made on a fiscally constrained metropolitan transportation plan and TIP in air quality nonattainment and maintenance areas consistent with DOT's metropolitan planning regulations [see 40 CFR 93.108].
>
> "Relative to STIP/TIP development in air quality nonattainment and maintenance areas, projects included in the first two years of the STIP and TIP shall be limited to those for which funds are "available" or "committed" [see 23 CFR 450.216(m) and 23 CFR 450.324(i), respectively]. Definitions for the terms "available funds" and "committed funds" are contained in 23 CFR 450.104. Therefore, nonattainment and maintenance areas may not rely upon proposed new taxes or other new revenue sources to support projects listed in the first two years of the TIP and STIP. As such, new funding from a proposed gas tax increase, bonding, a proposed regional sales tax, or a major funding increase still under consideration would not qualify as "available" or "committed" until it has been enacted by legislation or referendum. However, for the third and fourth years, the STIP/TIP may include a project or project phase if full funding can reasonably be expected to be available for the project within the time period contemplated for its completion."

It appears that MTC has utilized the newly liberalized definition of "fiscally constrained" to add $14 billion to the anticipated revenues. What are the details, year-by-year and source-by-source, of the "$400 million (in 2011 dollars) from these 'unanticipated' fund sources?"

We suspect that much of these funds is from sources such as the American Relief and Recovery Act, which tend to provide funds in large "lumps," with high uncertainty as to repeatability.

While I am deferring judgment as to the propriety of the inclusion, and the prudence, of including this $14 billion in the anticipated revenues until more specifics are provided, the overriding problem is that MTC, and Bay Area transportation projects, have had numerous examples of coming in far over anticipated budgets – particularly early planning budgets, as are many of the projects included in the *Plan*.

Some examples of such issues, and related MTC financial problems, are presented in the immediately following section. Even if one accepts that the $14 billion of "unspecified revenues that reasonably can be expected to become available within the plan horizon" have a reasonable chance of actually coming to pass – which I do not in the absence of detailed support from MTC – these are overwhelmed by the overruns likely to occur based on MTC's and the Bay Area's historical record in this regard.

EXAMPLES OF COST OVERRUNS, LATE DELIVERY, AND UNDER-PERFORMANCE IN PAST BAY AREA TRANSIT PROJECTS

San Francisco Bay Area Rapid Transit District Colma and SFO/Millbrae Extensions

The BART heavy rail system in the San Francisco Bay area began service in 1972. The Colma Station and Extension to San Francisco International Airport and Millbrae were the last additions opened, in 1996 and 2003, respectively. The SFO extension, 8.7 miles of track, four stations, and an operating and maintenance facility, is basically the third and final phase of a plan to extend the system to the airport (and, potentially, beyond). The one-mile extension to the Colma Station was the second, with the tail track storage line South from Daly City Station the first (not comprehended by this case study). Ridership data for these two projects, therefore, are very interrelated.

Colma Extension

This project consisted of a one-mile track extension and one new station with a bus transfer facility and a five-level, 1,400-space parking garage[80]. San Mateo County voters overwhelmingly approved the project in 1985, and the planning process began shortly thereafter. Between the time of the environmental impact statement (EIS) reports and the finish of the project the scope was decreased in terms of length and surface parking and was increased in terms of underground rail (up .08 miles) and elevated track (about .06 miles)[81].

Estimates contained in the draft EIS (DEIS) and final EIS (FEIS) reports in terms of capital expenditures were far below the actual costs incurred as is seen in the following table. This is due principally to the changes in scope. Increased raised rail and subway sections add to cost dramatically. The full-funding grant agreement (FFGA), however, was a reliable estimation of the final capital expenditure levels.

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[80] San Francisco Bay Area Rapid Transit District, April 15, 1993, "BART Chronology," accessed November 8, 2010:
http://www.bart.gov/docs/BARThistory.pdf

[81] DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 69 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

Predicted and Actual Capital Costs - BART Colma Extension[82]

	Total Capital Cost (millions)				Ratio of Actual to Predicted Costs (%)		
	AA/ DEIS	FEIS	FFGA	As-Built	As-Built vs. AA/ DEIS	As-Built vs. FEIS	As-Built vs. FFGA
As Estimated	$94.9 (1986 $)	$120.7 (1990 $)	$170.2 (1993 $)	$179.9	189.6%	149.1%	105.7%
Adjusted to Year of Opening (1996 $)	$112.5	$130.1	$171.6	$179.9	159.9%	138.2%	104.9%

While ridership estimates were higher than actual ridership, they came within about 10% of the actual as built levels. It is presumed that the difference is due to service levels being 33% below what was estimated in the DEIS and FEIS. Actual operating and maintenance (O&M) costs as compared to estimated costs are considered "reasonable" by the FTA.[83]

Because the BART system had been operating in the San Francisco Bay Area since 1972, and because there was considerable experience in planning and building rail systems and extensions, estimates for BART Colma were quite accurate. The FTA put it this way: "This project was a one station extension of a long operating existing heavy rail system with ample data regarding the existing travel patterns. High quality data and long experience with the transit market near the extension surely helped to facilitate accurate forecasts."[84] BART planners in this case were able to come within 10% of true ridership numbers and FFGA estimates were within 5% of the as-built capital cost.[85]

SFO/Millbrae Extension

This project extended the BART heavy rail system to San Francisco Airport and further South to Millbrae from the COLMA station, an addition of 8.7 miles and four stations.[86] This project is an example of how cost estimates often go up significantly over the course of the planning period between alternative analyses (AA), DEIS, FEIS, FFGA, and actual construction. The overall scope of this project also changed between DEIS and actual construction.

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[82] DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 72 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).
[83] DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 73 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).
[84] DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 72 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).
[85] DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 73 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).
[86] DOT/FTA, *The Predicted and Actual Impacts of New Starts Projects – 2007*, page 131.

In 1990, a preferred alternative was selected that included a three station, 6.4 mile rail extension with a locally funded, on-airport, light rail system, and was initially expected to cost $960 million (YOE). Three years later the DEIS was amended to take on a larger scope. The project was now expected to construct an 8.2 mile, four station extension, with a cost of $1.11 billion (YOE). Following a June 1996 FEIS, project cost had escalated further to $1.17 billion. This is the same amount specified in the 1997 FFGA, with a total federal New Starts obligation of $750 million and an expected revenue date of September 30, 2001.[87]

Within two years expected YOE cost was $1.51 billion and delays were expected.[88] One important change to the project at this time was upgrading five existing rail yards instead of buying rail vehicles. Besides this the contractor experienced delays due to weather, there was an unexpected requirement to increase the size of the aerial structures to withstand earthquakes, as well as some environmental impact mitigation requirements that were not foreseen.[89] When the project finally opened for revenue two years late, the cost of completion had run to $1.55 billion. Because the amounts of Federal and State of California ($152 million) did not increase as the project cost increased, the entire amount of the overrun – $382 million – was paid from local sources, for a total of $650 million (not including finance charges), over 240% of the originally projected local share of $268 million.[90]

Much of the increase in cost was due to the decision to bring the line directly into the airport proper – where it connects to a people-mover to move passengers around the terminal – rather than extending the people-mover to a station on the direct line to Millbrae on the West side of the Bayshore freeway (US101). This decision also led to exceedingly clumsy operations – both the SFO and Millbrae stations are "one-way" in/out, so the operator has to shift to the other end of the train before leaving – and direct Millbrae-SFO service is no longer operated, forcing passengers with destinations at either of these stations to wait for the proper train, and longer headways for those departing these two stations.

Not only did project costs come in well over what was initially envisioned for this extension, ridership was very far below what was expected. Both the DEIS and FEIS forecasted average weekday boardings of approximately 68,000 by 2010. The first year of operations (2003) saw only 17,965 average weekday boardings. This number grew to only 26,284 by 2007 and is expected to fall far short of the 2010 forecast.[91] Taking the actual weekday exit numbers for 2010 and doubling them (to get an estimate of total weekday boardings) gives 29,886 boardings; approximately 44% of planning projections.[92]

The SFO extension is in many ways closely linked to the Colma Station extension, and it can be difficult to parse out the ridership numbers for these two projects. The predicted ridership levels

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87 *Ibid*, page 132, 3.
88 *Ibid.*, page 132.
89 *Ibid.*, page 135.
90 *Ibid*, page 135.
91 *Ibid.*, page 134.
92 Bay Area Rapid Transit, *BART Fiscal Year Weekday Average Exits*, available at http://www.bart.gov/docs/WeekdayExits.pdf

for Colma according to DEIS and FEIS estimates was to be 15,200 by the year 2000.[93] This prediction came in about 1,500 average daily boardings over the actual numbers;[94] or within 10% of estimates. However, ridership at Colma dropped off significantly after the 2003 opening of the SFO extension, with only 12,664 in 2003 and dropping further to 6,974 (again, calculated by doubling the number of station exits reported) by 2010.[95] Apparently the SFO extension cannibalized a large portion of the Colma ridership.

Taking the projections for both the Colma and SFO/Millbrae projects together, we would expect to have well over 80,000 daily riders by 2010, but the actual reported was 36,860 (exit counts doubled), or about 46% of expectations. Because much of the Colma ridership apparently shifted to the SFO extension upon completion, the 80,000 estimate obviously double counts many of the riders that would utilize any of these stops. While we would not predict that level of ridership now, this double counting did go into the "sales pitch" used to gain public support for the projects and to obtain federal funding.

The Colma and SFO/Millbrae extensions were part of a very complex, three-county agreement brokered by the Metropolitan Transportation Commission, the metropolitan planning organization for the nine-county San Francisco Bay Area. Alameda and Contra Costa Counties in the East Bay, two of the three original BART counties (the third being the City and County of San Francisco), both wanted extensions to "their" BART lines, but their ridership projections and costs made planners believe that these lines would not meet the criteria for Federal funding at the time. The SFO extension was then believed to be the most viable candidate for Federal funding, but it was in San Mateo County, which was not only *not* a BART county, but had dropped out of the BART compact before construction began, thus freeing its residents from paying the taxes to build and operate BART. This made it politically impossible for the East Bay politicians to extend BART to SFO in a non-BART county while not extending it to the many residents of the East Bay counties that had been paying BART taxes for years without any service within miles of their homes.

The compromise that was worked out essentially said that all three counties would enact additional half-cent sales taxes for transportation (including many non-BART projects), the Bay Area would apply for FTA funding for BART to SFO/Millbrae, the San Mateo County transportation tax would, in essence, pay for part of the cost of the construction of the extensions in the East Bay and, in return, San Mateo County would not only get a BART extension largely paid for the Federal government, but would also get improvements to Caltrain, the long-running – but seriously in-need-of-capital investment – commuter rail service from San Jose to San Francisco[96].

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[93] DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 72 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

[94] DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 72 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

[95] http://www.bart.gov/docs/WeekdayExits.pdf

[96] MTC Resolution 1876, "Regional Rail Agreements," March 24, 1988.

In order to make the financial plan pencil out, the assumption was that the high ridership on the SFO/Millbrae extension, coupled with the premium fare charged, would enable this portion of the BART system to operate without subsidies.

Unfortunately, the high fares and other factors acted to drive away riders – and the Millbrae Station, a joint BART/Caltrain station with across-the-platform-transfers, intended to attract Caltrain riders to shift to BART, which was presumed to offer faster and/or more convenient trips to the Market Street employment corridor in the San Francisco central business district, has not proven successful, with only 9,032 average daily boardings/deboardings (calculated as station exits doubled) in 2010[97].

Interestingly, the comparatively smaller investment in improving Caltrain service – which included adding new rolling stock, extensive use of limited stop service to significantly reduce travel times, extension of service South from San Jose, and extensive bicycle storage cars – produced a major increase in Caltrain service and it appears that this is where many of the expected SFO/Millbrae riders wound up. With these service improvements, Caltrain is significantly faster to many downtown destinations from Millbrae than BART. While Caltrain does not serve Downtown directly, there are a variety of transit connections at its terminus, including a light rail line that travels under Market Street, above the BART line, while the BART service takes a wide curve to the West before heading back towards downtown San Francisco. BART service to SFO/Millbrae opened in June of 2003 and the Caltrain "Baby Bullet" service began in June of 2004, both in the last month of the agencies' fiscal years.

From 2003 to 2004, the first full year of BART service to Millbrae, Caltrain ridership dropped 1.3%, to 6,625,358 unlinked passenger trips, but the following years, after the "Baby Bullet" service began, ridership increased to 8,120,853 in 2005, 9,004,662 in 2006, 10,264,225 in 2007, 10,914,621 in 2008, and 11,359,225 in 2009 – an overall increase, 2004 to 2009, of 71%.

The increase in daily commuter rail boardings exceeded 14,000 over this period. This number is slightly under half of the total boardings and deboardings on the SFO/Colma extension, but should be regarded as a higher percentage because the Caltrain trips are "full," origin-to-destination, trips far longer than the length of the BART extensions, while many of the BART trips are only partly within the extension[98].

The BART Colma/SFO/Millbrae extensions required $1,730 million and had 35,806 daily boardings – many of which were previous BART riders who transferred to a closer station, and most of whom only traveled part of their trip on these two BART extensions – in 2009. The Caltrain Baby Bullet had capital costs of $163 million to add 14,000 totally new riders for their entire trip – and significantly sped up the trips of many pre-existing Caltrain riders. While it is reasonable to believe that a significant portion of these 14,000 added daily Caltrain riders would have taken BART to downtown instead if the Baby Bullet service had not been implemented, it was certainly nowhere near all. Even if we add all 14,000 to the BART extension ridership, it

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97 http://www.bart.gov/docs/WeekdayExits.pdf

98 National Transit Database, "Profiles" for Caltrain for years cited, accessed November 8, 2010: http://www.ntdprogram.gov/ntdprogram/data.htm

would amount to approximately five-eighths of the 80,000 projected riders for the two BART extensions combined (which, as noted above, may include some double-counting).

Because the SFO/Millbrae extension service was not breaking even on operating costs, the San Mateo County Transit District (SamTrans) was obligated to pay BART for the subsidies. The underperformance led to reductions in BART service levels on this extension[99] and SamTrans' unbudgeted costs to pay the BART subsidies had negative impacts on SamTrans riders; chiefly line cancellations, service reductions, and fare increases, although SamTrans has maintained that there is not a direct connection to the BART SFO/Millbrae extension[100].

BART Dublin/Pleasanton and Warm Springs Extensions and Oakland Airport Connector

There have been two county-wide transportation sales taxes approved in Alameda County in recent decades, the first in 1986 and the second in 2000.

The following is an excerpt from *Alameda County Transportation Expenditure Plan*, August 1986, prepared by the Alameda Countywide Transportation Committee, the interim entity that was established to prepare the original program of projects and funding for the monies to be raised by a fifteen-year one-half cent sales tax. This document was intended to be the primary information for voters, elected officials, and other interested parties as they prepared to make their decisions to approve or disapprove the ballot measure[101]:

> "Project: Dublin Canyon Rail Extension/Warm Springs BART Extension
> Cost: $565 million Sales tax contribution: $170 million
>
> "This project includes two parts: the Dublin Canyon Rail extension and the Warm Springs BART Extension. Dublin Canyon will consist of a rail line from the Bayfair BART station along the I-580 corridor. Whether this line will be light or heavy rail will depend on the outcome of a locally produced Alternatives Analysis addressing this corridor.
>
> "The Warm Springs BART extension is planned to extend from the Fremont BART station to Warm Springs.
>
> "Dublin Canyon is expected to cost $220 million in a heavy rail configuration, and Warm Springs $345 million. A total of $170 million is to be allocated from sales tax revenues for the Dublin Canyon portion of this project. No sales tax

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[99] Michael Cabanatuan, "BART's Directors Approve Plan to Trim Service to S.F. Airport," San Francisco Chronicle/SFGate.com, August 12, 2005, accessed November 8, 2010 http://articles.sfgate.com/2005-08-12/bay-area/17384394_1_samtrans-bart-directors-blue-line

[100] Edward Carpenter, "SamTrans Struggles with Fiscal Woes," San Francisco Examiner, July 27, 2006, accessed November 8, 2010: http://www.sfexaminer.com/local/samtrans_struggles_with_fiscal_woes2006-07-27T09_00_00.html

[101] Page 5, Accessed May 2, 2013: http://www.alamedactc.org/files/managed/Document/7697/1986_MeasureB_Expenditure_Plan.pdf

> revenue will be allocated to the Warm Springs extension until the Dublin Canyon extension is fully funded and ready for implementation. "

The above costs are expressed in 1986 dollars (page 7). All conversions to constant dollars are made by using the U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index-Urban Consumers, for the San Francisco-Oakland-San Jose area.

Obviously, the message that anyone reading the above would take away would be that a vote for the sales tax would result in the construction of both the Dublin Canyon and Warm Springs extensions. While the document, very properly, did not mandate a specific transit mode, leaving that for the later Alternatives Analysis and follow-on process, the clear identification of the cost of heavy rail – BART – served as a clear indicator of the most likely outcome.

The Pleasanton Extension wound up costing $514 million[102]. Construction was completed in 1998, so, assuming a 1996 mid-point of construction, the 1986 dollars cost was approximately $370 million – or approximately $150 million, or 68%, over the 1986 estimate.
The above does not include the costs of the West Dublin/Pleasanton Station, BART's first – and, to date, only – "in-fill" station (a station not added at the end of a pre-existing transit line). There is some argument that this station was to be part of the Dublin Canyon extension, but was eliminated as a cost-reduction measure. It opened 2011, at a cost of $106 million[103], including a $20 million budget overrun and a significant delay in opening due to design/construction issues, and this was up from a $25 million construction estimate in 2002[104]. If we assume a 2009 date for construction mid-point, the $106 million would be $53 million in 1986 dollars. If this were to be added to the extension cost above, the total would be approximately $423 million, $203 million, or 92%, over the 1986 cost projection that was provided to voters to guide them in making their decision to approve the transportation sales tax.

Because of the shortfall caused by the cost overrun on this extension, among other things, there was no funding in the 1986 bond issue to fund the Warm Springs extension, which had to be delayed until a new source of funding was found – an extension of the original sales tax.

The following are excerpts from "Alameda County's 20-Year Transportation Expenditure Plan," July 2000[105]. This document was prepared for the election that year on the extension of the sales tax authorized in 1986 and had a similar origin and purpose. All costs are in 1998 dollars (page 10):

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[102] OPAC Consulting Engineers, "BART Dublin/Pleasanton Extension," accessed May 2, 2013: http://www.opacengineers.com/projects/BARTDPX

[103] BART, "New West Dublin/Pleasanton Station, BART's 44th, to open February 19," January 21, 2011, accessed May 2, 2013: http://www.bart.gov/news/articles/2011/news20110121.aspx

[104] *Hacienda Network*, "Dublin/Pleasanton BART: Changing the Tri-Valley Commute in Just Five Years," April 16, 2002, accessed May 2, 2013: http://www.hacienda.org/ho/nw0204_bart5th.html

[105] Accessed May 2, 2013: http://www.alamedactc.org/files/managed/Document/8472/2000_Measure_B_Ballot_and_Plan.pdf

"BART Extension to South Fremont (to connect to Santa Clara County Extension)

Sales Tax Funding	$165,500,000
Other Funding Sources	$380,800,000
Project Cost	$546,300,000" (page 12)

"BART Oakland Airport Connector

Sales Tax Funding	$ 65,800,000
Other Funding Sources	$ 64,200,000
Project Cost	$130,300,000" (page 13)

The cost of the Warm Springs extension had gone from $220 million in 1986 dollars to $546.3 million 1998 dollars, which is approximately $369 million in 1998 dollars – an increase of approximately $149 million, or approximately 68%.

The current Alameda County Transportation Commission "Project Fact Sheet" for the BART Warm Springs Extension, March 2013[106], shows a total cost of $890 million and a mid-point of construction of approximately 2012, which would convert that cost to approximately $412 million in 1986 dollars – an increase of approximately $192 million, or approximately 87%, in constant 1986 dollars.

The project appears headed for revenue service in 2015 – thirty years after the Alameda County voters passed a bond issue that they were told would fund it.

From the "Project Fact Sheet" for the BART Oakland Airport Connector[107], we have a total project cost of $484.1 million. The mid-point of construction appears to be 2012, so this converts to approximately $331 million in 1998 dollars, when a cost of $130.1 million was given to the voters to assist them in making their decision to support the sales tax extension or not. This is an overrun of approximately $200 million – or approximately $154%.

This expenditure will provide a fixed guideway transit system from the Oakland Airport to the nearby BART Coliseum Station, with two additional stops along the alignment, which will replace a self-supporting bus system. The Airport Connector is expected to be slightly faster and, not being subject to traffic delays, will likely offer more consistent travel times than the existing AirBART shuttle buses, but it is questionable if the fares, which are expected to double

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[106] Accessed May 2, 2013: http://www.alamedactc.org/files/managed/Document/4654/ACTIA6020_BARTWarmSpringsExtension_factsheet.pdf

[107] Accessed May 2, 2013: http://www.alamedactc.org/files/managed/Document/4642/ACTIA6030_BARTOaklandAirportConnector_factsheet.pdf

when the Connector opens, will cover the costs of operations and capital renewal and replacement, or if the taxpayers, or airport patrons, will have to otherwise subsidize it.

(These results may offer something of an explanation of why, after the first two Alameda County Transportation Sales Tax issues passed relatively easily, the third attempt, B1 in November 2012, failed to be approved by the required two-thirds majority.)

Sonoma-Marin Area Rail Transit (SMART)

The proposal to operate what was originally known as commuter rail, but is now defined by the Federal Transit Administration as "hybrid rail[108]," on the Southern segments of the Northwestern Pacific Railroad, has been active in Marin and Sonoma Counties for decades.

Originally, this effort was led by the Golden Gate Bridge, Highway and Transportation District, which began buying segments of the then abandoned line from the Southern Pacific Railroad in the early 1990's, but this responsibility was transferred from Golden Gate approximately two decades ago.

What is now known as SMART, and the funding that was to pay for its construction and operation, was approved by the voters of Marin and Sonoma Counties – after previous failures – at the November 2008 election.[109] The plan was for a 70-mile, fourteen-station rail line from

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[108] Federal Transit Administration, National Transit Database, *2012 Reporting Manual*, "Mode," pages 42-43 and 46, accessed May 9, 2013:
http://www.ntdprogram.gov/ntdprogram/pubs/ARM/2012/html/2012_Reporting_Manual_Table_of_Contents.html

[109] Some of the earlier proposals were astonishingly incompetent.

In 1998, I was engaged by the Environmental Defense Fund to study the then-current proposal for SMART, "Sonoma-Marin Multi-Modal Transportation and Land-Use Study – Working Paper #3, Preliminary Capital & Operating Cost Estimates, *Rail System Technical Addendum*, January 31, 1997, the "86 Train a Day" plan, among other things:

1. Proposed operating the line with ten-minute headways (six trains per hour), peak hour, peak direction, which was impossible with the single track line.
2. In a service variation, discussed operating twenty-minute headway service in the peak direction and thirty-minute service in the off-peak direction, which would have also been impossible on the single track line – and if attempted, would have resulted in a head-on collision between the second South-bound train and the first North-bound train.
3. The ten-minute headway service alternative was to have been operated with three-car consists, which would mean 18 rail cars arriving at the then-Southern terminus at Larkspur during the peak hour. This operating plan also had reverse commute service on a twenty-minute headway with two car trains, which is six cars an hour, peak hour, departing Larkspur. However, there was no maintenance or storage facility at Larkspur, which meant that there would be no place to store the arriving vehicles that were not turned back North, twelve trains in that peak hour.
4. While it would not be possible to operate the service anticipated, the number of vehicles required to operate the service was undercounted.
5. In general, the document showed a very disturbing lack of understanding of what is required to operate single track passenger service, particularly in regard to the required number and placement of passing tracks and stations.
6. The level of service proposed to be provided – up to 86 trains a day – was astonishingly high, particularly in comparison to the currently planned fourteen round-trip trains per day, all two-car trains

(continued)

Cloverdale in Sonoma County South to the Larkspur Ferry Terminal in Marin County, to be fully operational by 2014, with 66% of a parallel bicycle/pedestrian pathway completed by 2014 and the rest by 2029, funded primarily by a one-quarter-cent two-county sales tax, to cover the projected $449.8 million rail and $90.6 million bicycle/pedestrian pathway construction costs (in 2008 dollars, total of $646.5 million in year-of-expenditure dollars) and annual operating and maintenance costs of $19.3 million (2008 dollars) [110].

To provide additional levels of assurance as to the practicality of the plan to the voters, SMART commissioned a series of "White Papers," including White Paper No. 18, "SMART's Financial Plan," in which Dr. Robert Eyler, director of the Center for Regional Economic Analysis at Sonoma State University, describes the 20-year funding plan as "Reasonable and conservative[111]."

However, the plan began to crumble almost before the election returns were certified. A combination of sales tax revenues significantly less than what had been assumed prior to the economic collapse, failure to prepare proper construction cost estimates based on through analysis of site conditions and requirements, and other issues quickly produced a shortfall that, despite major efforts to access new funding sources, use innovate financing, and reduce costs without major changes in the program, were far from successful.

The current plan is to open a 38.5-mile, nine-mile line between Santa Rosa – Railroad Square in the North and San Rafael – Downtown in the South, omitting the Larkspur Ferry and five stations on the planned Northern end of the line, with service beginning late 2015/early 2016. The cost of Phase I is projected to be $360 million[112].

It appears that the he remaining portion of the originally planned system, and major segments of the bicycle/pedestrian pathway, will be completed when funding allows.

San Francisco Central Subway

For this project, graphs are the best presentation of changes over time.

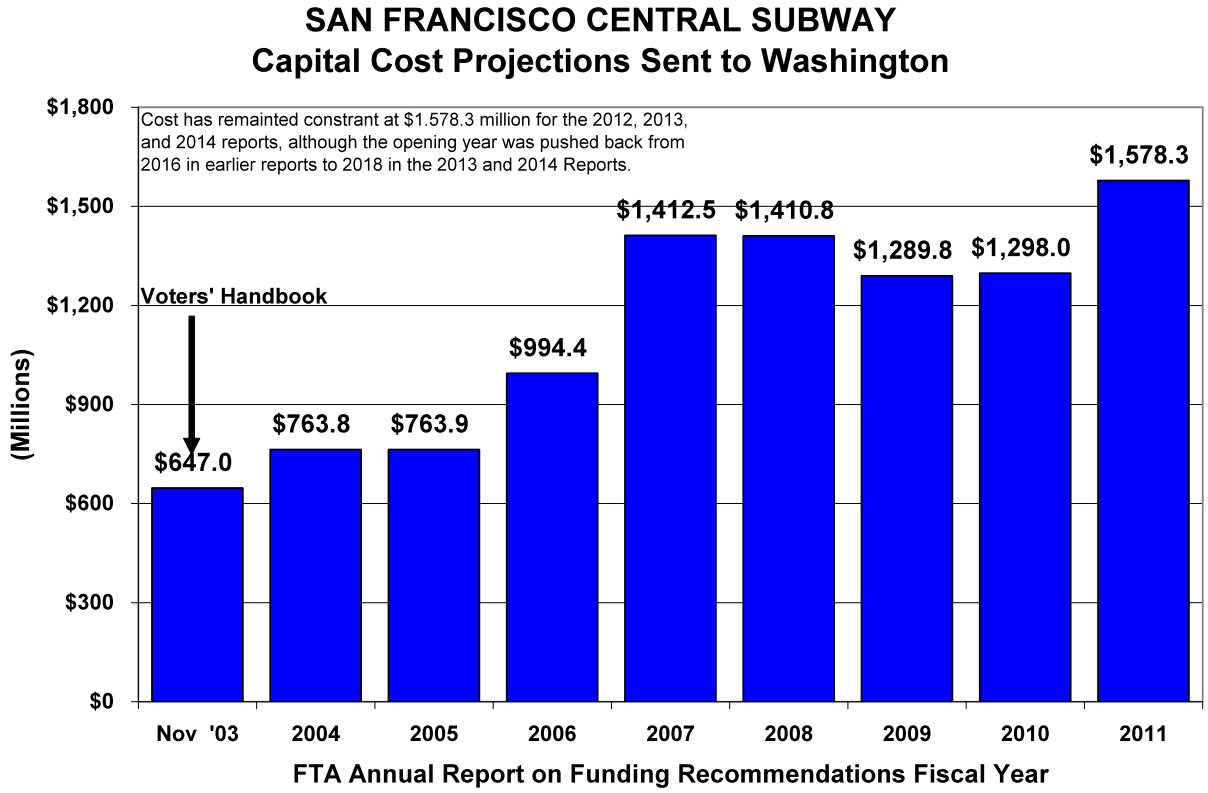
(SMART, "What is SMART?," accessed May 9, 2013: http://www2.sonomamarintrain.org/index.php/what_is_smart/)

Source: Thomas A. Rubin for Environmental Defense Fund, "Sonoma/Marin Land Use And Transportation Study – Rail Operations Plan (86 Trains Per Day), May, 1998."

[110] SMART, *Smart Project Funding Plan*, July 2008, pp. 5, 8, 9, and 22: http://www2.sonomamarintrain.org/userfiles/file/Funding%20Plan%20-%2007-15-08%20Final%20Version.pdf

[111] SMART, "SMART's Financial Plan:" http://www2.sonomamarintrain.org/userfiles/file/18_whitepaper_financial.pdf

[112] SMART, "Overview:" http://www2.sonomamarintrain.org/userfiles/file/18_whitepaper_financial.pdf



All data in this section, unless otherwise specified, is from the U.S. DOT/FTA series, *Annual Report on New Starts*[113]. As can be seen above, the projected capital cost – for this 1.7-mile, three station project, including procurement of four vehicles, and without any costs for maintenance and operating facilities – increased from the $647.0 million cost presented to the voters for approval by 144% to $1,578.3 million (approximately $928 million per mile) from what was submitted to the voters in 2003 to the current costs reported to the Federal government.

The costs to complete the project presented in reports to Congress and FTA have not changed since 2009, even though the start-up date has been pushed back two years, the scope has been altered to include the Pagoda Theater tunnel boring machine option, and the station construction contract has evidently come in $90 million over expectations. Perhaps what has been touted as a very large contingency will be sufficient to cover all costs of what appears to be significant increased construction costs, but we'll just have to wait to see.

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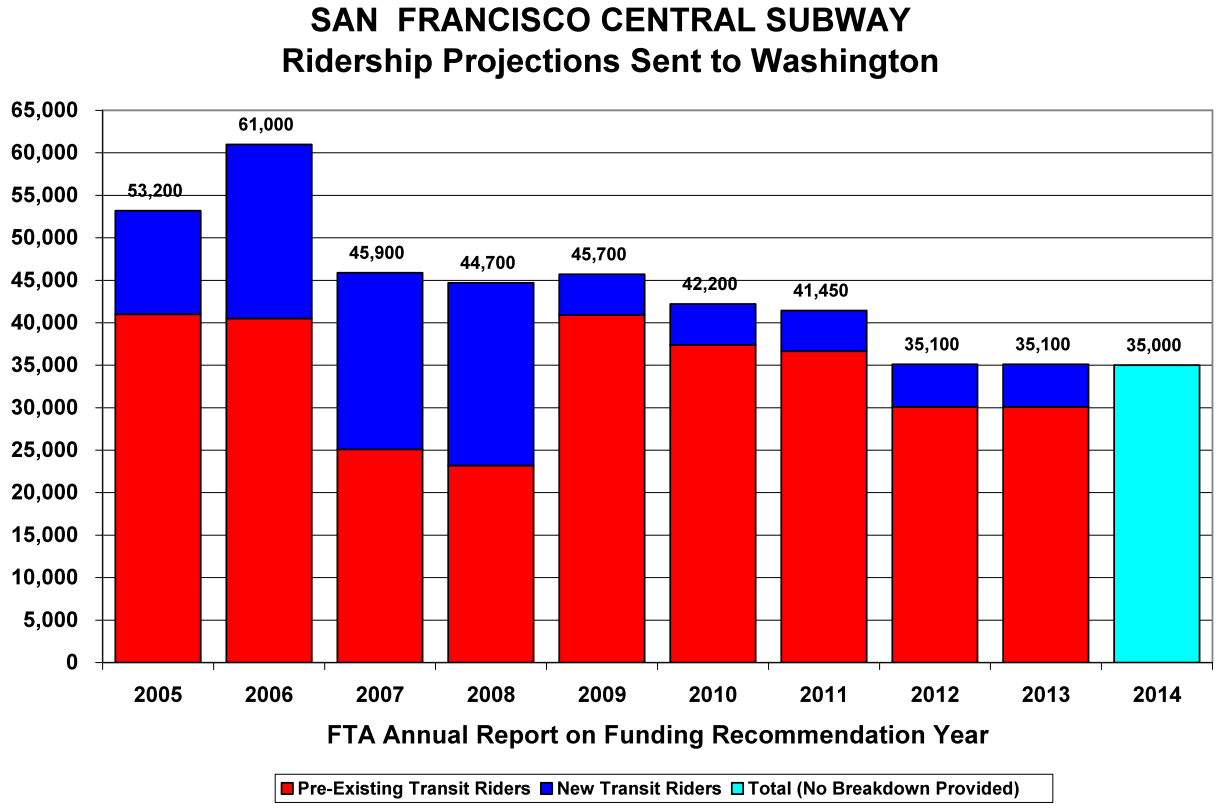
[113] The *Annual Report on New Starts* is published annually, generally according the following schedule:

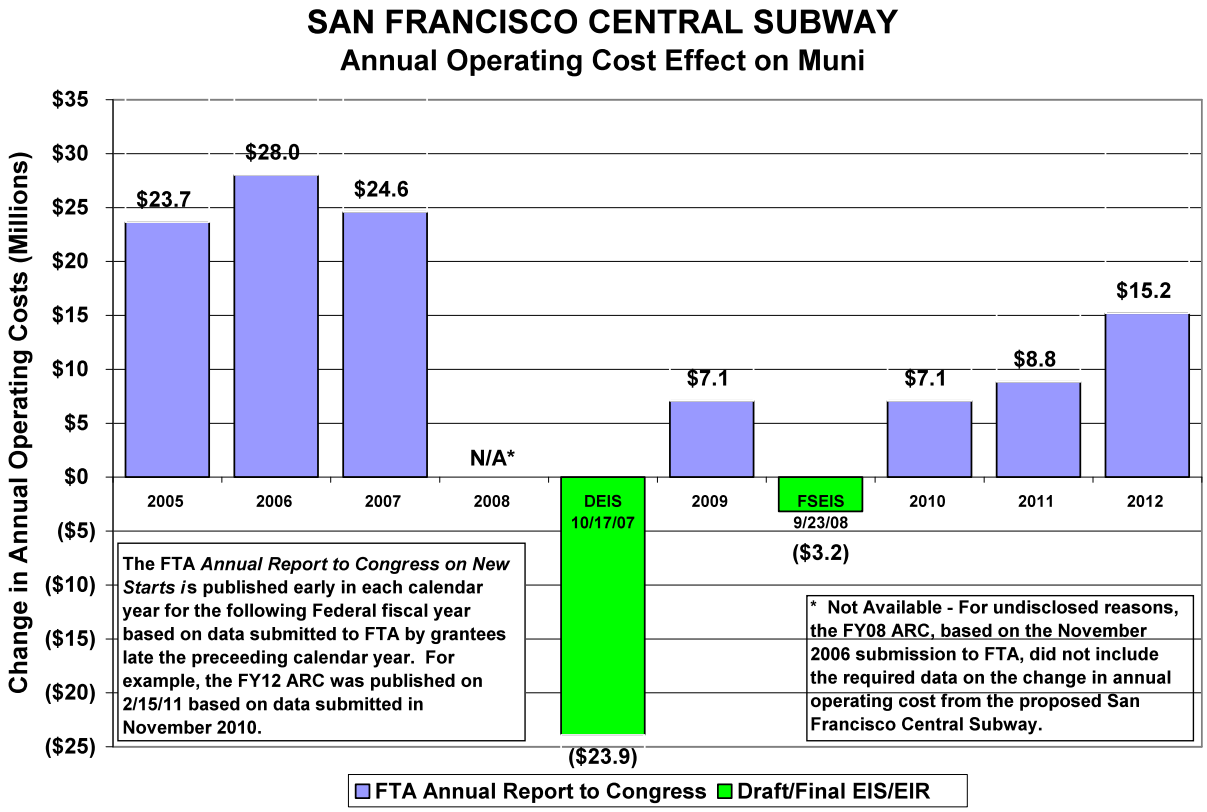
1. Grant applicants/recipients submit their reports to FTA in November of each year – for the 2014 report, November of 2012.
2. The various reports from grant applicants/recipients is compiled by FTA staff and, along with other data, is generally published in the Spring; for the 2014 report, the Spring of 2013.
3. The report is the recommendation for expenditures for the upcoming fiscal year – 2014 in this case.

http://www.fta.dot.gov/12304_2618.html

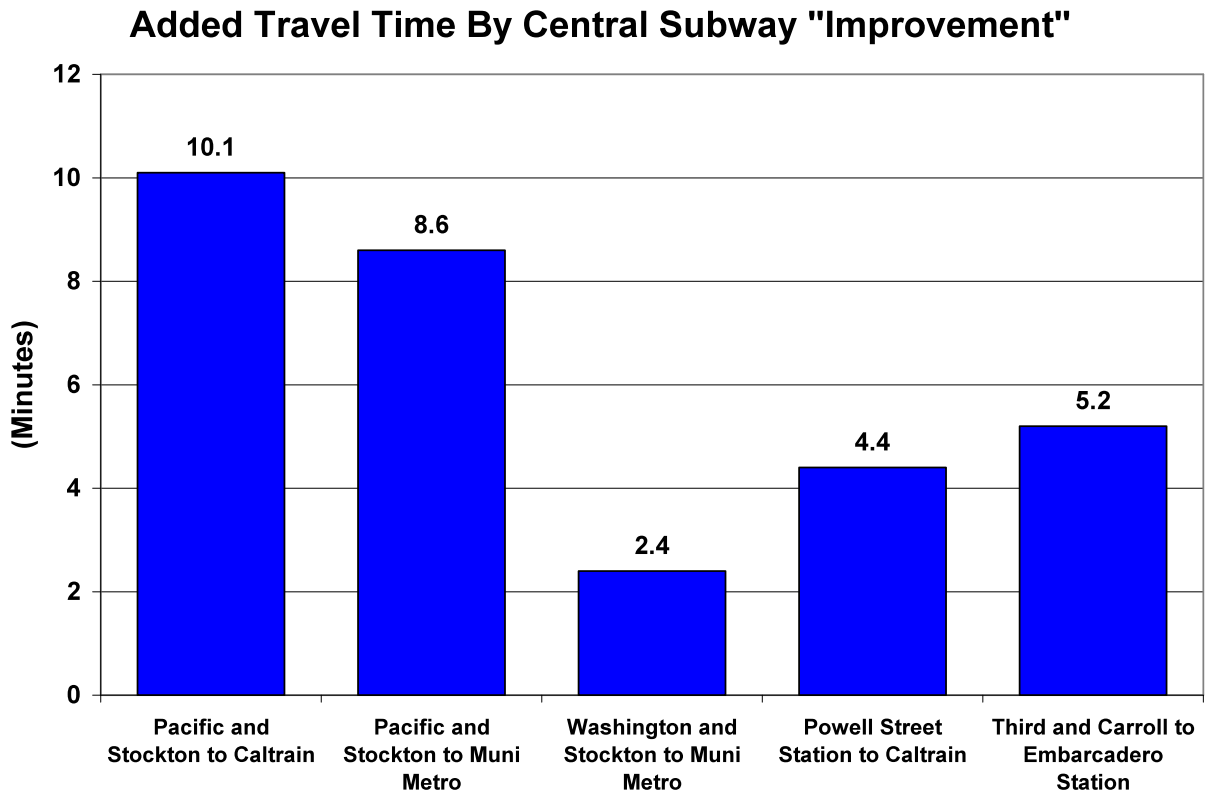


We have also seen an interesting progression of projected ridership over time, with the latest projection, 35,000 daily riders, at 57% of the 61,000 that was promulgated in 2004, when the project was far from approved.

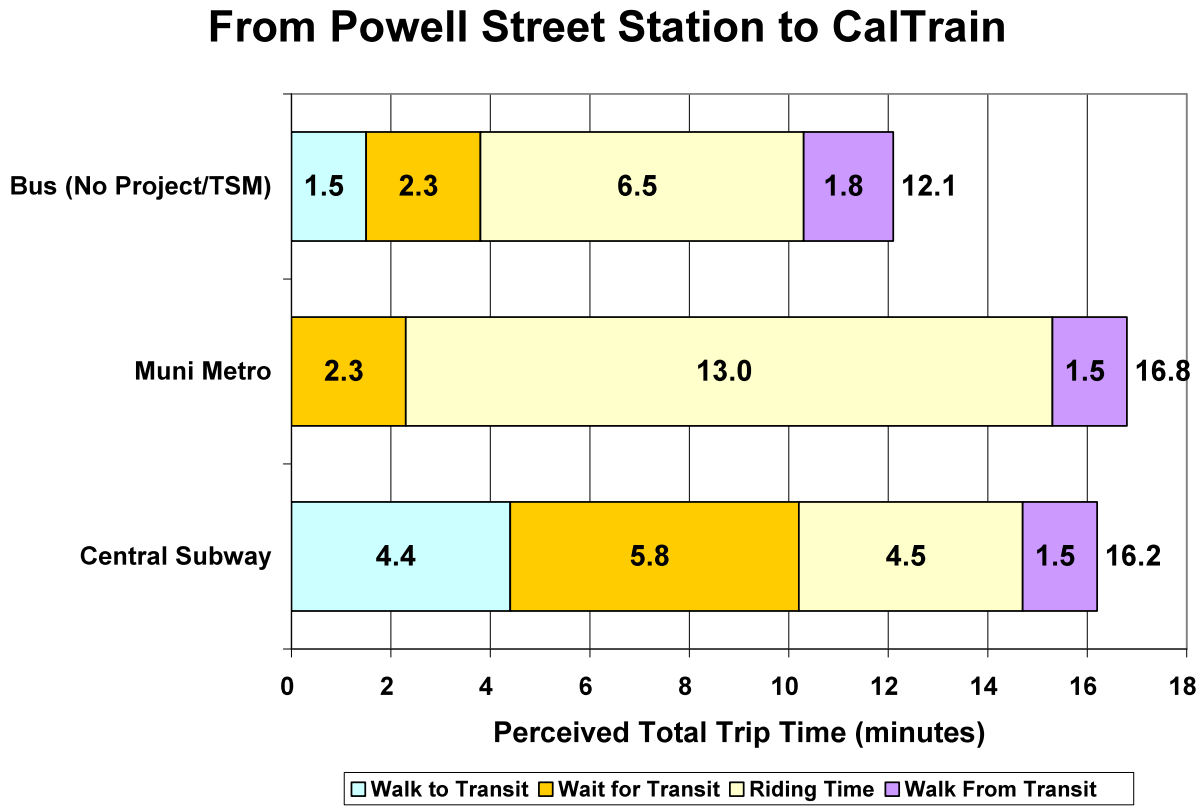
The portion of new riders has also dropped significantly, down to approximately one-seventh of total riders, down from almost half in the 2008 report.



The projected financial impact on MUNI operations has also varied widely from year to year and from presentation to presentation.



Finally, the Central Subway appears to have a serious deficiency as a transit improvement – it appears that the travel times – particularly the all-important perceived travel times – will increase for many heavily utilized origin-destination pairs. The above table summarizes, and the one below details, the differences.



Although this $1.5+ billion dollar project was, of course, presented to the voters as a transportation improvement, the strange workings of the changes to the networking of lines, coupled with the poor connectivity of the Central Subway to Market Street, will evidently increase the perceived travel time from present day for many major trips[114].

South San Francisco Ferry

The South San Francisco Ferry is a recent addition to the Bay Area transportation system – and, to date, it appears to be an extremely expensive and non-productive one[115].

Well-respected San Francisco Area investigative journalists and columnists Philip Matier and Andrew Ross have calculated a taxpayer subsidy per trip of approximately $47. However, using the FTA "new starts" costing methodology[116], we get a slightly different figure:

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[114] Travel time analysis performed by Howard Strassner, civil engineer (retired).

[115] Philip Matier and Andrew Ross, "South San Francisco Ferry Loaded With Subsidies," *SFGate*, March 17, 2013: http://www.sfgate.com/bayarea/matier-ross/article/South-San-Francisco-ferry-loaded-with-subsidies-3659513.php

[116] FTA, "Standard Costs Categories (SCC) for Capital Projects," SCC Workbook: http://www.fta.dot.gov/13070_2580.html

Capital Costs:

Oyster Point Ferry Terminal:		
Capital Cost:	$26 million	
Times: SCC Discount Factor, 70-year Life, discounted @ 7%:	0706	
Annualized Capital Cost:		$1.836 million
Two Ferries:		
Capital Cost	16 million	
Times: SCC Discount Factor, 25-year Life, discounted @ 7%:	.0858	
Annualized Capital Cost:		1.373 million
Annual Operating Cost:		2.66 million
Total Annualized Cost:		5.9 million
Divided By: Annual Boardings:		.1 million
Annualized Cost per Boarding:		$59

MTC and the other sponsors, according to the story, are planning on increased ridership. However, considering that there are eight one-way trips per weekday, and four weekday holidays a year[117], that leaves approximately 251 days of service, with 2,008 one-way trips per year. Dividing the current 100,000 annual boardings by the number of trips works out to an average passenger load of approximately 50 – on 140-passenger ferries. Given the unbalanced operating schedule – three Westbound and one Eastbound trip for the morning peak, the opposite for the afternoon peak – it is difficult to see how much larger the ridership could get without adding trips , given that the sole Eastbound afternoon trip must carry the passengers from all three morning Westbound trips.

This service pattern is evidently part of the overall plan for this service, which appears to be largely to bring East Bay residents to Genentech and other existing local companies, plus drive development of office parks in the 70 acres around the terminal. The validity of this business plan is still to be proven

If ridership tripled – which appears questionable – then the operating cost/passenger would be just under $20/trip, assuming no change in operating schedule.

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[117] South San Francisco Ferry Schedule: http://www.sanfranciscobayferry.com/route/oakland/ssf

Bay Bridge Eastern Span

For decades, knowledgeable engineers and seismologists have been concerned that that the Eastern Span of the San-Francisco-Oakland Bay Bridge was susceptible to collapse in a major earthquake.

Following the 1971 San Fernando Valley earthquake, which caused major damage to many freeway structures, the Eastern Span was strengthened, but, in the 1989 Loma Prieta "World Series" earthquake, part of the upper deck collapsed upon the lower deck, killing an unfortunate motorist, and the difficulties of the month-long shutdown of the Bridge while repairs were being performed served to convince virtually all parties that a major upgrade project was essential.

The original proposal was for a $200 million retrofit of the existing structure, but this option was rejected, in part due to the collapse of a retrofitted freeway overpass in the 1994 Northridge earthquake and because the retrofitted bridge would have a fairly short (approximately 30 years) useful life[118].

The next stage was for a "vanilla" replacement for the existing structure, which was originally expected to be about double of the cost of the retrofit, but provide two to three times the useful life. However, various politicians and stakeholders objected to the appearance of this proposal – perhaps, in large part, because the "San Francisco" side of the Bay Bridge had long been regarded as one of the world's most beautiful bridges, while the "Oakland" side was seen as the ugly stepsister – not unlike the feeling that many East Bay residents have long had regarding the general relationship between San Francisco and Oakland.

A 1997 cost projection for a basic viaduct plan, more-or-less an update of the design of the original Eastern Span, was $1.1 billion – which was again rejected on largely aesthetic grounds.

This led to an architectural design contest, with the winner being by far the most expensive.

Then came the question of should the new structure be built North or South of the existing structure, which took several months to a few years to resolve – and added more cost.

Another issue was that the design required certain very specialized components which were contracted to China, which meant that the "Buy America" provisions for Federal funding were violated, negating the use of funding from that source (although this is something of a non-issue, as most Federal funding is allocated on a formula basis, and the Bay Area has no shortage of eligible projects requiring funding).

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[118] Army Corps of Engineers, *Final Report Evaluation & Assessment of Proposed Alternatives To Retrofit/Replace the East Span of the San Francisco–Oakland Bay Bridge (Report). U.S. Army Corps of Engineers*, October 27, 2000:
http://www.oaklandbridge.com/army%20final.html

When construction finally was authorized to begin in the early 2000's, the next problem was that the single bid received for the signature tower was almost double the engineers' estimate, $1.4 billion vs. $780 million – and bids for other work were also significantly higher than expected.

In 2004, in the midst of the State fiscal crisis, Governor Schwarzenegger announced that the State did not have the funding necessary to complete the bridge as designed, which appeared to be designed to impose a requirement to find a more economical design. However, when he attempted to impose a simple viaduct design, the attempt failed for various reasons, one of them being Coast Guard objections to the narrowing of the shipping channel under the bridge.

After further delay – which again raised costs, probably adding hundreds of millions of dollars to the cost – the compromise was to build the bridge under the design that had been approved, with the State providing part of the extra costs and the users, through higher bridge tolls and bonds against those tolls, the rest.

The cost is now estimated at $6.3 billion (not including the cost of demolition and removal of the existing bridge).

There has been, and still are, various technical issues, specifically as to welds, eyebar cracking, and the bolts, the latter of which makes the scheduled Labor Day 2013 opening uncertain.

This is one of the worst examples of the lack of ability of the transportation and governmental governance of the Bay Area, and the State of California, to control a project. The cost increasing many-fold is a very obvious undesired outcome, but perhaps what is more damning is that, following a long-understood seismic safety problem, and a critical failure in 1989 that made the issue impossible to put off any longer, it will have taken at least 24 years for the absolute most important roadway in the Bay Area to receive the necessary upgrade to withstand the earthquake that everyone knows is coming.